# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

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| **Hatchery Program:** | Grays River Hatchery Type-N Coho (Integrated/segregated) |
| **Species or Hatchery Stock:** | Type-N Coho (*Oncorhynchus kisutch*) Grays River Stock |
| **Agency/Operator:** | Washington Department of Fish and Wildlife |
| **Watershed and Region:** | Grays River Sub-basin/ Columbia River Estuary Province |
| **Date Submitted:** | |
| **Date Last Updated:** | August 19, 2014 |

## Executive Summary

The Washington Department of Fish and Wildlife is submitting a Hatchery and Genetic Management Plan (HGMP) for the Grays River Type-N (late-returning) coho program to the National Marine Fisheries (NMFS) for consultation under Section 10(a)(1)(A) or 4(d) of the Endangered Species Act (ESA). NMFS will use the information in this HGMP to evaluate the hatchery impacts on salmon and steelhead listed under the ESA. The primary goal of an HGMP is to devise biologically-based hatchery management strategies that ensure the conservation and recovery of salmon and steelhead populations. This HGMP focuses on the implementation of hatchery reform actions adopted by the Washington Fish and Wildlife Commission Policy on Hatchery and Fishery Reform C-3619.

The purpose of the program is to produce Grays River Type-N coho for sustainable escapement to the watershed, while providing recreational harvest under mark-selective fisheries. Program fish will be produced at the Grays River Hatchery, located on the West Fork Grays River (WRIA 25.0130), tributary to the Grays River (WRIA 25.0093). The program will annually release 150,000 yearlings to the Grays River. In addition, this program provides up to 40,000 eyed-eggs to the Peterson Coho Project enhancement co-op program, located near the mouth of an unnamed tributary to the lower Columbia River at R.M 16, near Knappton WA.

This Type-N Coho HGMP is built around the principles and recommendations of the Hatchery Scientific Review Group (HSRG). These principles and recommendations represent the best science available for operating hatchery facilities consistent with the conservation of salmonid species. The on-station program has been operated as an "integrated type" program, as defined by the HSRG, since its inception in 2007. An "integrated" program is one in which natural-origin individuals are used in the hatchery broodstocks. Integration is achieved by using up to 30% of the returning adult natural-origin Type-N coho (distinguished by an intact adipose fin) returning to Grays River Hatchery from October through December. Coho have been 100% mass-marked (adipose fin-clipped) from this facility since brood year 1995; of these, 45,000 yearlings (30%) are also released coded-wire tagged (CWT). In addition, the Peterson Coho Project releases up to 39,000 ad-clipped sub-yearlings.

The Lower Columbia River coho are listed as "Threatened" under the ESA. The ESU includes the Grays River and Peterson Coho Project artificial propagation programs.

**Broodstock Collection:**
The broodstock is derived from stock returning to the Grays Sub-basin. The proportion of natural-origin fish in the broodstock (pNOB) has averaged 8% over the last 4 years. The current egg-take goal for the integrated program is 250,000 at Grays River Hatchery, with around 92 adult pairs collected; the current egg-take goal for the segregated program is around 50,000, from around 18 hatchery-origin adult pairs. Surplus hatchery fish in excess of broodstock needs are donated to food banks or used for system nutrient enhancement; all hatchery-identified coho are removed from the system to maintain desired pHOS levels.

**Harvest:**
Total annual harvest is dependent on management response to annual abundance in *Pacific Salmon Commission* (PSC - U.S./Canada), *Pacific Fishery Management Council* (PFMC - U.S. ocean), and *Columbia River Compact* forums. WDFW has also received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the *Fisheries Management and Evaluation Plan* (FMEP), *Columbia River Fish Management Plan* (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process. The *U.S. v Oregon* Technical Advisory Committee (TAC) has prepared Biological Assessments (BAs) for combined fisheries based on relevant *U.S. v Oregon* management plans and agreements. The current BA concerns Columbia River treaty Indian and non-Indian fisheries, as described in the "2008–2017 *U.S. v Oregon* Management Agreement for upriver Chinook, sockeye, steelhead, coho, and white sturgeon" (2008–2017 MA).

Due to tagging limitations not all fish can be accounted for as being harvested or as back-to-rack counts, smolt-to-adult survival rates (SAR) are likely underestimated. Based on an average SAR of 1.85% for

brood years 2007-2009, and a programmed release goal of 150,000 yearlings, the estimated production goal would be 2,775 adults.

The Grays River Type-N program was initiated in 2007 (2009 release year), replacing the Type-S coho program. Preliminary harvest data for the Type-N program is available for three years.

**Monitoring and Evaluation:**
Performance indicators for harvest will be accomplished by continuing mass-marking (adipose fin-clip); CWT recoveries help determine stray rate contributions on spawning grounds by watersheds close in proximity to this program's release vicinity.

**Operation and Maintenance of Hatchery Facilities:**
Grays River Hatchery has water rights to divert water at a rate of 11 cfs from the West Fork Grays River and a maximum 2 cfs water is drawn from a well and an unnamed non fish-bearing nearby creek. The return water systems operate under a National Pollutant Discharge Elimination System (NPDES) permit.

Water for the Peterson Coho Project is supplied from a gravity-fed holding tank used for non-potable water from an unnamed non fish-bearing nearby stream through an upstream intake on the landowner's property. This project uses a short-term rearing and off-channel acclimation pond. Feeding and production stays under NPDES guidelines for permitting.

# 1 SECTION 1. GENERAL PROGRAM DESCRIPTION

## 1.1 Name of hatchery or program.

Grays River Hatchery Type-N Coho

## 1.2 Species and population (or stock) under propagation, and ESA status.

Grays River Type-N Coho (*Oncorhynchus kisutch*)

ESA Status: "Threatened" June 28, 2005 (70FR37160); reaffirmed on August 15, 2011 (76 FR 50448).

## 1.3 Responsible organization and individuals

*Hatchery Operations Staff Lead Contact*


**Name (and title):** Mark Johnson, Hatcheries Operations and Complex Manager
**Agency or Tribe:** Washington Department of Fish & Wildlife
**Address:** 165 Osprey Lane, Toledo WA 98591
**Telephone:** (360) 864-6135
**Fax:** (360) 864-6122
**Email:** Mark.Johnson@dfw.wa.gov


*Fish Management Staff Lead Contact*


**Name (and title):** Eric Kinne, Region 5 Hatchery Reform Coordinator
**Agency or Tribe:** Washington Dept. of Fish and Wildlife
**Address:** 2108 Grand Boulevard, Mail Stop: S-19, Vancouver, WA 98661-4624
**Telephone:** (360) 906-6747
**Fax:** (360) 906-6776
**Email:** Eric.Kinne@dfw.wa.gov


**Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:**

NOAA-National Marine Fisheries Service (NMFS) – Manager of Mitchell Act Funds

## 1.4 Funding source, staffing level, and annual hatchery program operational costs.

| Funding Sources | Operation Information |
|---|---|
| Mitchell Act | Full time equivalent staff – 3.2 |
| | Annual operating cost (dollars) - $414,537 |

The above information for full-time equivalent staff and annual operating cost applies cumulatively to anadromous program facilities and cannot be broken out specifically by program.

## 1.5 Location(s) of hatchery and associated facilities.

**Broodstock Source:** Grays River Type-N (late-returning) coho

**Table 1.5.1:** Location of culturing phases, by facility.

| Facility | Culturing Phase | Location |
|---|---|---|
| **Grays River Hatchery** | Broodstock collection, Adult holding/spawning, Incubation, Rearing, Acclimation | West Fork Grays River (WRIA 25.0130) at RKm 3.2; tributary to the Grays River (WRIA 25.0093) at RKm 20.3; tributary to the Columbia River at RKm 37.0, Lower Columbia River, Washington |
| **Peterson Project RSI** | Incubation, early rearing | Located at N 46.271072 W 123.830281, on an unnamed tributary to the Columbia River at approximately RKm 25.7 (R.M 16), off Hagerup Rd, near the Knappton Cove Heritage Center. |

## 1.6 Type of program.

Integrated Harvest/Conservation (on-station releases)

Segregated Harvest (Peterson Coho Project)

## 1.7 Purpose (Goal) of program.

Mitigation/Augmentation. The goal of this program is to provide escapement to the watershed and meet sport harvest goals under the mark-selective fishery regulations (retention of adipose-clipped fish only), while minimizing impacts to natural-origin listed salmonids and steelhead.

Development of a hatchery coho brood stock similar to the late returning historical populations in the coastal region to improve abundance and distribution of naturally-produced coho. The proposed integrated strategy for this program is based on WDFW's assessment of the genetic characteristics of the hatchery and local natural population, the current and anticipated productivity of the habitat used by the populations, the potential for successfully implementing an isolated program, and NMFS' listing determination (August 15, 2011 76 FR 50448). Integration of natural origin broodstock (NOBs) into existing hatchery stocks is consistent with principals of the Hatchery Scientific Review Group (HSRG), hatchery reform goals and with the Lower Columbia Fish Recovery Board (LCFRB) Hatchery Sub-Basin Plans. The percentage of natural influences changes (PNI) have been modeled by the "All-H Analyzer" (AHA), with short-term goals for hatchery programs. WDFW proposes to integrate coho programs at minimum levels of 10% and up to 35% where NOBs are available. WDFW will review options needed to increase the pNOB% for longer term integration goals with eventual Percentage of Natural Influence (PNI) achieving >0.67.

In addition, this facility provides HxH eggs (segregated program) for the Peterson Coho Project, which releases coho fry (200 fpp) into the mainstem Columbia River.

## 1.8 Justification for the program.

The program is funded through the Mitchell Act via NOAA-NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River basin. WDFW protects listed fish and provides harvest opportunity on hatchery fish through the Lower Columbia River *Fish Management and Evaluation Plan* (FMEP) (WDFW 2001). All mainstem and tributary salmon fisheries are managed as mark-selective (no wild retention) fisheries to minimize the impact on listed wild fish. The Mitchell Act programs are intended to support Northwest fishing economies – particularly coastal and Native American -- that have relied on Columbia River production both before and after dam construction. Catches of hatchery fish sustain the economies of local communities while keeping incidental mortalities of ESA-Listed fish at approved levels. Value of hatchery production and benefit to local economies will be further increased by implementing fisheries that increase harvest of hatchery produced fish, as expected through implementation of the LCSRP.

To minimize impact on listed fish by the Grays River Hatchery Type-N Coho program and operations, the following risk aversions are included in this HGMP (**Table 1.8.1**).

**Table 1.8.1:** Summary of risk aversion measures for the Grays River Type-N Coho program.

| Potential Hazard | HGMP Reference | Risk Aversion Measures |
|---|---|---|
| Water Withdrawal | 4.1 | Water rights are formalized through trust water right from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. |
| Intake Screening | 4.1 | The intake screens are in compliance with state and federal guidelines (NMFS 1995, 1996), but do not meet the current *Anadromous Salmonid Passage Facility Design Criteria* (NMFS 2011). Structures have been assessed, and changes |

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| | | have been proposed (Mitchell Act Intake and Fish Passage Study Report 2003). |
| Effluent Discharge | 4.1 | This facility operates under the "U*pland Fin-Fish Hatching and Rearing*" *National Pollution Discharge Elimination System* (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-1010. |
| Broodstock Collection & Adult Passage | 7.9 | All fish are mass marked (adipose fin clipped and/or coded wire tagged) prior to release. Broodstock collection and sorting procedures can quickly identify listed non-target listed fish, and if encountered, released per protocol to minimize impact as determined by WDFW Region 5 staff. |
| Disease Transmission | 7.9, 10.11 | The *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006) and the *Fish Health Policy in the Columbia Basin* details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995). |
| Competition & Predation | 2.2.3, 10.11 | Fish are released at a time, size and the system and life history stage to foster rapid migration to marine waters, and to allow juvenile listed fish to grow to a size that reduces potential for predation.<br>Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish. |

## 1.9 List of program "Performance Standards".

See HGMP section 1.10. Standards and indicators are referenced from Northwest Power Planning Council (NPPC) Artificial Production Review (APR) (NPPC 2001).

## 1.10 List of program "Performance Indicators", designated by "benefits" and "risks."

### 1.10.1 "Performance Indicators" addressing benefits.

**Table 1.10.1:** "Performance Indicators" addressing benefits.

| **Benefits** | | |
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| **Performance Standard** | **Performance Indicator** | **Monitoring & Evaluation** |
| *3.1.2* Program contributes to mitigation requirements. Program provides mitigation for lost fish production due to development within the Columbia River Basin. | Number of fish released by program returning, or caught, as applicable to given mitigation requirements. | Annually estimate survival and contribution for each brood year released.<br>This program provides mitigation for lost fish production due to development within the Columbia River Basin and contributes to a meaningful harvest in sport and commercial fisheries. |
| *3.1.3* Program addresses ESA responsibilities. | Program complies with Federal ESA-listed fish take authorizations for harvest and hatchery actions. The FMEP has been submitted to NOAA and was revised after the coho listing. Ocean and Columbia | Hatchery program operation addresses ESA requirements through the development and review of this HGMP. HGMP updated and re-submitted to NOAA with significant changes |

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| | River fisheries are covered under section 7 permits. | or under permit agreement.<br>Compliance with ESA is managed with sport fishery regulations that minimize impacts to ESA-listed fish and are monitored by WDFW law enforcement officers. The FMEP outlines anticipated encounter rates and expected mortality rates for these fisheries. Natural populations are monitored annually to assess trends and compare with goals. |
| *3.2.1* Fish produced for harvest are propagated and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while adequately minimizing by-catch of non-target species. | Annual number of fish produced by this program caught in all fisheries, including estimates of fish released. | A quality control check is done prior to release to estimate the error rate of mass marking.<br>The external mark enables mark-selective fisheries, which can reduce directed harvest mortality on natural-origin fish.<br>Harvest is regulated to meet appropriate biological assessment criteria. Agencies monitor harvests to provide up-to-date information.<br>Estimate survival and contribution to fisheries for each brood year released. |
| *3.3.1* Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas. | An annual number of naturally-produced adults or redds on the spawning grounds or selected natural production index areas is estimated. | The returns to the hatchery and spawning grounds are monitored and reported annually |
| *3.3.2* Releases are sufficiently marked to allow statistically significant evaluation of program contribution to natural production, and to evaluate effects of the program on the local natural population. | Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (fin-clip, CWT, otolith-mark, other, etc., depending on species) production fish to identify them from naturally produced fish. See also 3.2.1 | Annually monitor and report size, number, mass-mark quality (mark rate/tag rate) and date of all hatchery releases by mark type.<br>Annually sample returning fish for the mass-mark and CWT in fisheries and at the hatchery; monitor and report numbers of estimated hatchery (marked) and natural (unmarked) fish.<br>Report CWT analysis to RMIS database. |
| *3.4.1* Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken. | Temporal distribution of broodstock collection at point of collection. | Collect broodstock representatively and systematically throughout the late return (late-October through mid-December).<br>Collect annual run timing, age and sex composition and |

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| | | spawning escapement timing data.<br>Adhere to WDFW spawning guidelines (Seidel 1983; HSRG 2009). |
| *3.5.5* Juveniles are released at fully-smolted stage to benefit juvenile to adult survival rates, and reduce the likelihood for residualism and negative ecological interactions with natural-origin fish. | Level of smoltification (size, appearance, behavior, etc.) at release compared to WDFW rearing and release guidelines.<br>Release type (forced, volitional, or direct). | Monitor fish condition in the facilities throughout all rearing stages.<br>Annually monitor and record size, number, and date of release. |
| *3.6.1* The hatchery program uses standard scientific procedures to evaluate various aspects of artificial propagation. | Apply basic monitoring standards in the hatchery: food conversion rates, growth trajectories, mark/tag rate error, weight distribution (CV). | Collect annual run timing, age and sex composition data upon adult return.<br>Annually record growth rates, mark rate and size at release and release dates.<br>See also HGMP section 11 for program monitoring and evaluation. |
| *3.8.3* Non-monetary societal benefits for which the program is designed are achieved. | Program is designed to help achieve the end goal of conserving and stabilizing natural salmon populations. | Long-term monitoring of system population will indicate success of program. |

### 1.10.2 "Performance Indicators" addressing risks.

**Table 1.10.2.1**: "Performance indicators" addressing risks.

| **Risks** | | |
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| **Performance Standard** | **Performance Indicator** | **Monitoring & Evaluation** |
| *3.1.3* Program addresses ESA responsibilities | Program complies with Federal ESA-listed fish take authorizations for harvest and hatchery actions. | HGMP is updated to reflect any major changes in program and resubmitted to NOAA fisheries.<br>Program risks have been addressed in this HGMP through best available science hatchery management actions.<br>WDFW staff annually reviews Future Brood Document (FBD) for stock, size, number, date and location of releases from all production programs.<br>Monitor and record juvenile hatchery fish size, number, date of release and mass-mark quality; monitor contribution of hatchery adult fish to fisheries and escapement. |
| *3.2.1* Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in all | The number of marks released and proportion of marks in out-migrant juveniles and returning adults on the spawning ground. | Monitor and record juvenile hatchery fish size, number, date of release and mass-mark (fin clips, tags, etc.) quality; monitor |

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| applicable fisheries management plans, while adequately minimizing by-catch of non-target species. | Production fish are mass-marked (adipose fin-clip) to allow for their differentiation from naturally-produced fish are estimated annually. | contribution of hatchery adult fish to fisheries and escapement.<br><br>Harvest is regulated to meet appropriate biological assessment criteria. Coho fisheries in the Grays River are mark selective, and require the release of all wild coho.<br><br>Agencies monitor harvests and hatchery escapements to provide up-to-date information. |
| *3.2.2* Release groups are sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries. | Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (adipose-fin clip, CWT, otolith-mark, etc., depending on species) produced fish to allow for their differentiation from naturally produced fish for selective fisheries. | Annually monitor and report size, number, date of release and mass-mark quality (adipose fin-clip rate) of all hatchery releases.<br><br>Annually assess harvest of mass-marked hatchery fish based on CRC estimates and creel surveys. |
| *3.3.2* Releases are sufficiently marked to allow statistically significant evaluation of program contribution to natural production and to evaluate effects of the program on the local natural population. | All hatchery production is identifiable in some manner (fin-marks, tags, otolith, etc.) consistent with information needs. | Annually monitor and record size, number, date of release and mass-mark quality (tag rate) of hatchery releases.<br><br>Examine returning fish encountered for the mass-mark (CWT) at the hatchery and on the spawning ground. Annually record numbers of estimated hatchery (marked) and natural (unmarked). |
| *3.4.1* Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken. | Temporal and age distribution of broodstock collected, compared to that of naturally-produced population at collection point. | Collect annual run timing, age and sex composition and return timing data. |
| *3.4.3* Life history characteristics of the natural population do not change as a result of the hatchery program. | Life history characteristics are measured in adult and juvenile hatchery fish: return timing, age and sex composition, spawning timing, and size in returning hatchery adults; size, growth rates, and survival to release in juvenile production.<br><br>Life history patterns of juvenile and adult NOR are stable. | Collect annual run timing, origin, and age and sex composition data.<br><br>Annually monitor and record juvenile hatchery fish size, growth rates, number released, mass-mark/tag data, survival-to-release rates, and date of release.<br><br>Examine returning fish for the mass-mark (fin-clips, CWTs) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked). |

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| *3.5.1* Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production. | Within and between populations, genetic structure is not affected by artificial production. | See HGMP section 11 for M&E information. |
| *3.5.2* Collection of broodstock does not adversely impact the genetic diversity of the naturally-spawning population. | Total number of natural-origin spawners (if any) reaching the collection facility.<br>Timing of collection compared to overall run timing. | All on-station hatchery releases are identifiable in some manner (fin-marks, tags, etc.).<br>Collect annual run timing, origin, and age and sex composition data.<br>CWT data reported to RMIS.<br>Examine returning fish for the mass-mark (fin-clips, CWTs) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked). |
| *3.5.3* Hatchery-origin adults in natural production areas do not negatively affect the total natural spawning population. | The ratio of observed and/or estimated total numbers of artificially-produced fish on natural spawning grounds, to total number of naturally-produced fish (pHOS). | Examine returning fish for the mass-mark (fin-clips, CWTs) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked).<br>Hatchery-origin fish in excess of broodstock needs are removed from the system (see HGMP section 7.5). |
| *3.5.4* Juveniles are released on-station, or after sufficient acclimation to maximize homing ability to intended return locations. | Location of release (on-station, acclimation pond, direct plant).<br>Release type (forced, volitional or direct stream release).<br>Proportion of adult returns to program's intended return location, compared to fisheries and artificial or natural production areas. | Examine returning fish for the mass-mark (fin-clips, CWTs) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked).<br>Annually record and report release information, including location, method and age class in hatchery data systems (WDFW Hatcheries Headquarters Database). |
| *3.5.5* Juveniles are released at fully-smolted stage. | Level of smoltification at release. Release type (forced, volitional or direct). | Annually monitor and record size, number, date of release and release type. |
| *3.7.1* Hatchery facilities are operated in compliance with all applicable fish health guidelines and facility operation standards | Annual reports indicating levels of compliance with applicable standards and criteria.<br>Periodic audits indicating level | Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests |

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| and protocols (IHOT, PNFHPC, *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State*). | of compliance with applicable standards and criteria. | for virus, bacteria, parasites and/or pathological changes, as needed. See also Attachment 1 for pre-release Fish Health History.<br>The program is operated consistent with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006), *Fish Health Policy in the Columbia Basin*, and *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995). |
| *3.7.2* Effluent from hatchery facility will not detrimentally affect natural populations. | Discharge water quality compared to applicable water quality standards by NPDES permit.<br>WDFW water right permit compliance. | Flow and discharge reported in monthly NPDES report (see HGMP section 4.2). |
| *3.7.3* Water withdrawals and in-stream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment. | Water withdrawals compared to NMFS, USFWS and WDFW applicable passage and screening criteria for juveniles and adults. | Barrier and intake structure compliance assessed and needed fixes are prioritized (see HGMP section 4.2). |
| *3.7.4* Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens. Follow the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, revised 2006). | Necropsies of fish to assess health, nutritional status, and culture conditions. | DFW Fish Health Section inspect adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems.<br>A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings. |
| | Release and/or transfer exams for pathogens and parasites. | Examine fish 1 to 6 weeks prior to transfer or release, in accordance with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). |
| | Inspection of adult broodstock for pathogens and parasites. | At spawning, lots of 60 adult broodstock are examined for pathogens. |
| | Inspection of off-station fish/eggs prior to transfer to | Controls of specific fish pathogens through eggs/fish |

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| | hatchery for pathogens and parasites. | movements are conducted in accordance to the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). |
| *3.7.6* Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally-produced population. | Spatial and temporal spawning distribution of natural populations above and below broodstock collection site is currently compared to historic distribution. | Trap is checked regularly. Non-target and/or listed fish, when encountered, are returned to the river. |
| *3.7.7* Weir/trapping operations do not result in significant stress, injury or mortality in natural populations. | Mortality rates in trap.<br>Pre-spawning mortality rates of captured fish in the hatchery and/or after release. | Traps checked regularly. Annually record and report abundances and observations of natural- origin fish at hatchery facilities. |
| *3.7.8* Predation by artificially produced fish on naturally – produced fish does not significantly reduce numbers of natural fish. | Hatchery juveniles are raised to smolt-size and released from the hatchery at a time that fosters rapid migration downstream. | Hatchery smolt release size and time are monitored to quantify/minimize predation effects on naturally-origin salmon and steelhead (Sharpe et al. 2008). |
| *3.8.2.* Juvenile production costs are comparable to or less than other regional programs designed for similar objectives. | Total cost of program operation. | Annually monitor and report feed costs and fish health actions. |

## 1.11 Expected size of program.

### 1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

*Integrated program.* Around 92 adult pairs, not including jacks, are needed to achieve the established egg-take goal of 250,000 (FBD 2014) for the on-station program. This is based on an average fecundity of around 3,000 smolts/female, and a pre-spawning mortality of 10%.

*Segregated program.* A total of around 18 hatchery-origin adult pairs are needed to achieve the egg-take goal of 50,000 collected for the Peterson Coho Project enhancement co-op program.

**Table 1.11.1.1:** Egg-take goals for Grays River Hatchery integrated and segregated program broodstocks.

| Program | Egg-Take | Program Type | Location | Major Watershed |
|---|---|---|---|---|
| Grays River on-station | 250,000 | Integrated | Grays River | Grays-Elochoman |
| Peterson Coho Project | 50,000 | Segregated | Columbia River | Grays-Elochoman |

Source: Future Brood Document 2014.

### 1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

**Table 1.11.2.1:** Proposed annual fish release levels (maximum number) by life stage and location, Grays River Hatchery Type-N coho.

| Age Class | Max. No. | Size (fpp) | Release Date | Location | Major Watershed |
|---|---|---|---|---|---|
| Yearlings | 150,000 | 15.0 | April | Grays River | Grays-Elochoman |
| Fry | 39,000 | 200.0 | April/May | Columbia River | Columbia mainstem |

Source: Future Brood Document 2014.

## 1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

**Table 1.12.1:** Total combined Coho program releases and adult returns to Grays River Hatchery from 2002-2013.

| Year | Total Release[a] | Hatchery Return |
|---|---|---|
| **2002** | 154,107 | 635 |
| **2003** | 153,000 | 829 |
| **2004** | 157,000 | 2,394 |
| **2005** | 146,000 | 4,838 |
| **2006** | 156,302 | 876 |
| **2007** | 157,500 | 984 |
| **2008** | 132,188 | 1,372 |
| **2009*** | 158,000 | 745 |
| **2010** | 153,000 | 4,791 |
| **2011** | 155,000 | 2,420 |
| **2012** | 163,000 | 953 |
| **2013** | 165,000 | 1,515 |
| **Average** | **154,175** | **1,862** |

Source: WDFW Hatcheries Headquarters Database 2014.
[a] Total Release = number released two years prior which generated the return.
[b] HOS on the spawning grounds.
[c] Minimum SAR% does not include all of the components needed to estimate SAR.
*Prior to 2009, Releases were Type S.

See also **Table 3.3.1.1**.

## 1.13 Date program started (years in operation), or is expected to start.

*Grays River Hatchery.* This facility began operations in 1961. The Type-N coho program was initiated in brood year 2007 (2009 release year), replacing the Type-S coho program, which was discontinued in 2008 (brood year 2006).

*The Peterson Coho Project.* This project was initiated with the goal of planting more Grays River chum in lower Columbia tributaries. As a trial run, Type-N Coho from Grays River were shipped to this project as eyed eggs in 2010.

## 1.14 Expected duration of program.

*Grays River Hatchery.* Program is on-going, with no plans for termination.

*The Peterson Coho Project.* This project is on-going, although in the future, this stock will be replaced with Grays River wild chum.

## 1.15 Watersheds targeted by program.

Grays Sub-Basin/ Grays River (WRIA 25.0093)/ Southwest Washington DPS/ Columbia River Estuary Province.

## 1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

### 1.16.1 Brief Overview of Key Issues.

Grays River coho is considered a Primary population for recovery. Both Type-S (early-run) and a Type-N natural component are present in the system. The Type-S stock enters the river from mid-

August through September, with peak spawning in late-October, while Type-N stock (characterized by a later spawn timing) generally enters the river from late-September through November, with peak spawning in November/December. The Type-N stock was rated as "depressed" in 1992. The hatchery program is a part of a strategy to meet conservation and/or harvest goals for the target stock.

The Grays River Hatchery has a water supply problem brought on by decades of environmental impacts associated with habitat degradation due to logging, road building, and the associated problems with very heavy rainfall in most winter seasons. An assessment and evaluation of the main intake was completed in 2010, which determined that the upper watershed is unstable and to expect bed load movement for the next 100 years. The passage and screening at this facility is also out of compliance and difficult to solve.

### 1.16.2 Potential Alternatives to the Current Program

*Alternative 1*: *Eliminate the program*: This action would reduce potential interaction with natural populations and eliminate potential impacts on other ESA-listed species. Currently this program supports popular sport fisheries in the lower Columbia and Grays Rivers, and is consistent with the mitigation requirements.

*Alternative 2: Develop a program using local type-N stocks.* HSRG (2009) recommended that an integrated harvest program be developed for the Type-N coho. WDFW initiated in brood year 2008 (2010 release year).

*Alternative 2: Shift the program to Beaver Creek Hatchery on the Elochoman River.* The Grays River Hatchery needs significant capital investment to solve the water quality, and intake compliance issues. Current funding has been appropriated to address intake issues at the Elochoman River intake at Beaver Creek. WDFW is currently evaluating options which may include moving the entire production to Beaver Creek Hatchery.

### 1.16.3 Potential Reforms and Investments

*Reform/Investment 1*: *Water quality and intake improvements*. The Grays River Hatchery needs significant capital investment to solve the water quality, and intake compliance issues. These would likely require a change in the intake from the upstream gravity system to a pump system that would not de-water the facility during the summer. Further action would be required to solve the bed load build up that threatens the facility on most winter heavy storm periods.

# 2 SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS. (USFWS ESA-Listed Salmonid Species and Non-Salmonid Species are addressed in Addendum A)

## 2.1 List all ESA permits or authorizations in hand for the hatchery program.

None currently. This HGMP is submitted to the NOAA Fisheries for ESA consultation and take prohibition exemption under ESA section 4(d) or 10.

## 2.2 Provide descriptions, status, and projected take actions and levels for NMFS ESA-listed natural populations in the target area.

### 2.2.1 Description of NMFS ESA-listed salmonid population(s) affected by the program.

**- Identify the NMFS ESA-listed population(s) that will be directly affected by the program.**

**Lower Columbia River coho (*Oncorhynchus kisutch*)**. Identified as a candidate species on June 25, 1995 (60FR38011). Listed as threatened on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

**- Identify the NMFS ESA-listed population(s) that may be incidentally affected by the program.**

**Lower Columbia River steelhead (*Oncorhynchus mykiss*)**. Listed as a threatened species on March 19, 1998 (63FR13347); threatened status reaffirmed on January 5, 2006 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

**Lower Columbia River Chinook (*Oncorhynchus tshawytscha*).** Listed as "threatened" on March 24, 1999 (64FR14308); threatened status reaffirmed on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

**Columbia River chum salmon (*Oncorhynchus keta*)**. Listed as threatened on March 25, 1999 (64FR14507); threatened status reaffirmed on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

### 2.2.2 Status of NMFS ESA-listed salmonid population(s) affected by the program.

**- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds.**

**Lower Columbia River Chinook**: In Washington, the LCR Chinook ESU includes all naturally spawned Chinook populations from the mouth of the Columbia to a transitional point between Washington and Oregon east of the Hood River and the White Salmon River, as well as fifteen artificial propagation programs. Excluded are upper Columbia River bright hatchery stocks that spawn in the mainstem Columbia River below Bonneville Dam and in other tributaries upstream from the Sandy River to the Hood and White Salmon rivers (NMFS 2014 79FR20802).

**Status:** Today only two of 32 historical populations – the North Fork Lewis and Sandy late-fall populations – are considered viable. Most populations (26 out of 32) have a very low probability of persistence over the next 100 years, and some populations are extirpated, or nearly so. Five of the six strata fall significantly short of the Willamette- Lower Columbia Technical Recovery Team (WLC TRT) criteria for viability. One stratum – Cascade late fall – meets the WLC TRT criteria (Dornbush and Sihler 2013). Dam construction eliminated habitat for a number of populations leading to the extirpation of spring Chinook salmon populations in the Upper Cowlitz, Cispus, Tilton, North Fork Lewis , Big White Salmon rivers, and fall Chinook populations in the Upper Cowlitz and Big White Salmon rivers (SHIEER, NMFS 2004). Projects to allow access have been initiated in the Cowlitz and Lewis systems but these are not close to producing self-sustaining populations; Condit Dam on the Big White Salmon River was breached October 26, 2011. Based on the 2010 recovery plan analyses, all of the 14 Tule populations (**Table 2.2.2.1**) are considered very high risk except one that is considered at high risk. The modeling conducted in association with Tule harvest management suggests that three of the populations (Coweeman, Lewis and Washougal) are at a somewhat lower risk (LCFRB 2010).

**Table 2.2.2.1:** Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River Chinook populations.

| | | Baseline viability | | | | | Prod. | Abundance | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Population | Contribution | A&P | S | D | Net | Obj. | target | Historical | Baseline | Target |
| **Coast Fall** | | | | | | | | | | |
| Grays/Chinook | Contributing[2] | VL | H | VL | VL[2] | M+ | +500% | 800 | <50 | 1,000 |
| Eloch/Skam [C] | Primary | VL | H | L | VL[2] | H | +150% | 3,000 | <50 | 1,500 |
| Mill/Aber/Germ | Primary[1] | VL | H | L | VL[2] | H | +155% | 2,500 | 50 | 900 |
| Youngs Bay (OR) | Stabilizing | --[3] | --[3] | --[3] | L | L | --[3] | --[3] | --[3] | --[3] |
| Big Creek (OR) [C] | Contributing[1] | --[3] | --[3] | --[3] | VL | L | --[3] | --[3] | --[3] | --[3] |
| Clatskanie (OR) | Primary | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| Scappoose (OR) | Primary[1] | --[3] | --[3] | --[3] | L | H | --[3] | --[3] | --[3] | --[3] |
| **Cascade Fall** | | | | | | | | | | |
| Lower Cowlitz [C] | Contributing | VL | H | M | VL[2] | M+ | +50% | 24,000 | 500 | 3,000 |
| Upper Cowlitz | Stabilizing | VL | VL | M | VL | VL | -- | 28,000 | 0 | -- |
| Toutle[C] | Primary[1] | VL | H | M | VL[2] | H+ | +265% | 11,000 | <50 | 4,000 |
| Coweeman [G] | Primary | VL | H | H | VL[2] | H+ | +80% | 3,500 | 100 | 900 |
| Kalama | Contributing[2] | VL | H | M | VL[2] | M | +110% | 2,700 | <50 | 500 |
| Lewis [G] | Primary | VL | H | H | VL[2] | H+ | +280% | 2,600 | <50 | 1,500 |
| Salmon | Stabilizing | VL | H | M | VL | VL | -- | n/a | <50 | -- |
| Washougal | Primary | VL | H | M | VL[2] | H+ | +190% | 2,600 | <50 | 1,200 |
| Clackamas (OR) [C] | Contributing | --[3] | --[3] | --[3] | VL | M | --[3] | --[3] | --[3] | --[3] |
| Sandy (OR) | Contributing[1] | --[3] | --[3] | --[3] | VL | M | --[3] | --[3] | --[3] | --[3] |
| **Cascade L Fall** | | | | | | | | | | |
| Lewis NF [C,G] | Primary | VH | H | H | VH[1] | VH | 0% | 23,000 | 7,300 | 7,300 |
| Sandy (OR) [C,G] | Primary | --[3] | --[3] | --[3] | H | VH | --[3] | --[3] | --[3] | --[3] |
| **Cascade Spring** | | | | | | | | | | |
| Upper Cowlitz [C,G] | Primary | VL | L | M | VL[2] | H+ | >500% | 22,000 | 300 | 1,800 |
| Cispus [C,G] | Primary | VL | L | M | VL[2] | H+ | >500% | 7,800 | 150 | 1,800 |
| Tilton | Stabilizing | VL | VL | VL | VL | VL | 0% | 5,400 | <100 | -- |
| Toutle | Contributing | VL | H | L | VL | M | >500% | 3,100 | 100 | 1,100 |
| Kalama | Contributing[2] | VL | H | L | VL | L | >500% | 4,900 | 100 | 300 |
| Lewis NF [C] | Primary | VL | L | M | VL | H | >500% | 15,700 | 300 | 1,500 |
| Sandy (OR) [C,G] | Primary | --[3] | --[3] | --[3] | M | H | --[3] | --[3] | --[3] | --[3] |
| **Gorge Fall** | | | | | | | | | | |
| L. Gorge (WA/OR) | Contributing | VL | M | L | VL[2] | M | >500% | n/a | <50 | 1,200 |
| U. Gorge (WA/OR) [C] | Contributing[1] | VL | M | L | VL[2] | M | >500% | n/a | <50 | 1,200 |
| White Salmon [C] | Contributing | VL | L | L | VL | M | >500% | n/a | <50 | 500 |
| Hood (OR) | Primary[4] | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| **Gorge Spring** | | | | | | | | | | |
| White Salmon [C] | Contributing | VL | VL | VL | VL | L+ | >500% | n/a | <50 | 500 |
| Hood (OR) | Primary | --[3] | --[3] | --[3] | VL | VH | --[3] | --[3] | --[3] | --[3] |

Source: LCFRB 2010.

L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.

[1] Increase relative to interim Plan.

[2] Reduction relative to interim Plan.

[3] Addressed in Oregon Management Unit plan.

[C] Designated as a historical core population by the TRT.

[G] Designated as a historical legacy population by the TRT.

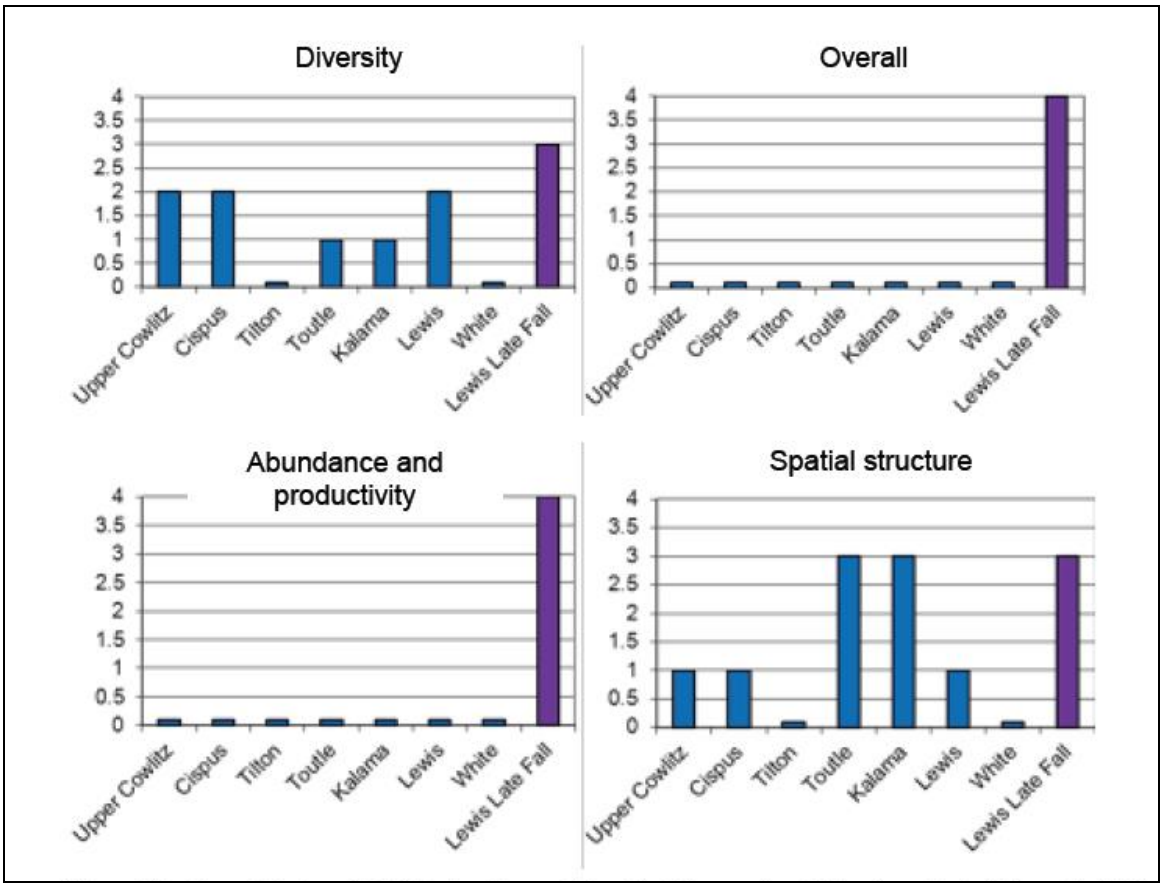


**Figure 2.2.2.1** Current status of Washington lower Columbia River spring Chinook and late fall-run (bright) Chinook salmon populations for the VSP parameters and overall population risk. (LCFRB Recovery Plan 2010, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

**Lower Columbia River Steelhead *(Oncorhynchus mykiss*)**: The DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in streams and tributaries to the Columbia River between the Cowlitz and Wind Rivers, Washington (inclusive), and the Willamette and Hood Rivers, Oregon (inclusive), and excludes fish originating from the upper Willamette River Basin above Willamette Falls. The DPS includes seven artificial propagation programs, including the Cowlitz Trout Hatchery Winter-late (Lower Cowlitz), Kalama River Wild (winter- and summer-run) and Lewis River Wild Winter (NMFS 2014 79FR20802).

**Status:** Today, 16 of the 23 Lower Columbia River steelhead populations have a low or very low probability of persisting over the next 100 years, and six populations have a moderate probability of persistence. Only the summer-run Wind population is considered viable. All four strata in the DPS fall short of the WLC TRT criteria for viability (Dornbush and Sihler 2013). Populations in the upper Lewis and Cowlitz watersheds remain cut-off from access to essential spawning habitat by hydroelectric dams. Projects to allow access have been initiated in the Cowlitz and Lewis systems but these have not yet produced self-sustaining populations (Ford 2011). Condit Dam on the White Salmon River was breached October 26, 2011. WDFW is currently developing watershed-specific management plans in accordance with the SSMP. As part of this planning process, WDFW is proposing to complete a thorough review of current steelhead stock status using the most up to date estimates of adult abundance, juvenile production and genetic information.

**Table 2.2.2.2:** Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River steelhead populations.

| | | Baseline viability | | | | | Prod. | Abundance | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Population | Contribution | A&P | S | D | Net | Obj. | target | Historical | Baseline | Target |
| **Coast Winter** | | | | | | | | | | |
| Grays/Chinook | Primary | VH | VH | M | M[1] | H | 0%[4] | 1,600 | 800 | 800 |
| Eloch/Skam | Contributing | VH | VH | M | M[1] | M+ | 0%[4] | 1,100 | 600 | 600 |
| Mill/Ab/Germ | Primary | H | VH | M | M[1] | H | 0%[4] | 900 | 500 | 500 |
| Youngs Bay (OR) | Primary | --[3] | --[3] | --[3] | VH | VH | --[3] | --[3] | --[3] | --[3] |
| Big Creek (OR) | Primary | --[3] | --[3] | --[3] | H | VH | --[3] | --[3] | --[3] | --[3] |
| Clatskanie (OR) | Primary | --[3] | --[3] | --[3] | VH | VH | --[3] | --[3] | --[3] | --[3] |
| Scappoose (OR) | Primary | --[3] | --[3] | --[3] | VH | VH | --[3] | --[3] | --[3] | --[3] |
| **Cascade Winter** | | | | | | | | | | |
| Lower Cowlitz | Contributing | L | M | M | L | M | +5% | 1,400 | 350 | 400 |
| Upper Cowlitz [C,G] | Primary | VL | M | M | VL[2] | H[1] | >500% | 1,400 | <50 | 500 |
| Cispus [C,G] | Primary | VL | M | M | VL[2] | H[1] | >500% | 1,500 | <50 | 500 |
| Tilton | Contributing | VL | M | M | VL | L | >500% | 1,700 | <50 | 200 |
| S.F. Toutle | Primary | M | VH | H | M | H+ | +35% | 3,600 | 350 | 600 |
| N.F. Toutle [C] | Primary | VL | H | H | VL[2] | H | +125% | | 120 | 600 |
| Coweeman | Primary | L | VH | VH | L[2] | H | +25% | 900 | 350 | 500 |
| Kalama | Primary | L | VH | H | L[2] | H+ | +45% | 800 | 300 | 600 |
| N.F. Lewis [C] | Contributing | VL | M | M | VL[2] | M | >500% | 8,300 | 150 | 400 |
| E.F. Lewis | Primary | M | VH | M | M[1] | H | +25% | 900 | 350 | 500 |
| Salmon | Stabilizing | VL | H | M | VL[2] | VL | 0% | na | <50 | -- |
| Washougal | Contributing | L | VH | M | L[2] | M | +15% | 800 | 300 | 350 |
| Clackamas (OR) [C] | Primary | --[3] | --[3] | --[3] | M | H | --[3] | --[3] | --[3] | --[3] |
| Sandy (OR) [C] | Primary | --[3] | --[3] | --[3] | L | VH | --[3] | --[3] | --[3] | --[3] |
| **Cascade Summer** | | | | | | | | | | |
| Kalama [C] | Primary | H | VH | M | M[1] | H | 0%[4] | 1,000 | 500 | 500 |
| N.F. Lewis | Stabilizing | VL | VL | VL | VL | VL | 0% | na | 150 | -- |
| E.F. Lewis [G] | Primary | VL | VH | M | VL[2] | H | >500% | 600 | <50 | 500 |
| Washougal [C,G] | Primary | M | VH | M | M[1] | H | +40% | 2,200 | 400 | 500 |
| **Gorge Winter** | | | | | | | | | | |
| L. Gorge (WA/OR) | Primary | L | VH | M | L[2] | H | +45% | na | 200 | 300 |
| U. Gorge (WA/OR) | Stabilizing | L | M | M | L[2] | L | 0% | na | 200 | -- |
| Hood (OR) [C,G] | Primary | --[3] | --[3] | --[3] | M | H | --[3] | --[3] | --[3] | --[3] |
| **Gorge Summer** | | | | | | | | | | |
| Wind [C] | Primary | VH | VH | H | H[1] | VH | 0%[4] | na | 1,000 | 1,000 |
| Hood (OR) | Primary | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |

Source: LCFRB 2010.

L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.

[1] Increase relative to interim Plan.

[2] Reduction relative to interim Plan.

[3] Addressed in Oregon Management Unit plan.

[4] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.

[C] Designated as a historical core population by the TRT.

[G] Designated as a historical legacy population by the TRT.

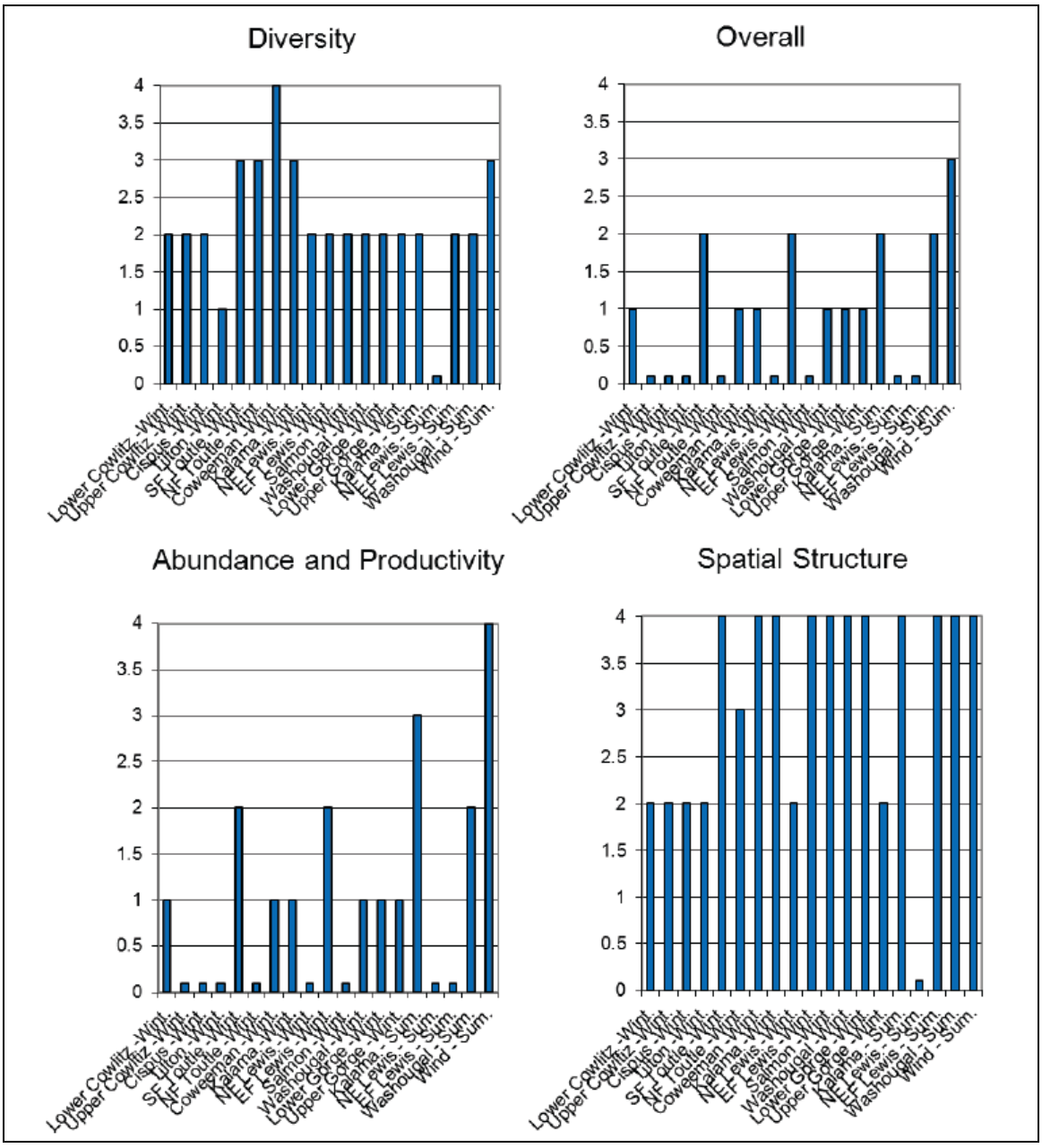


**Figure 2.2.2.2:** Current status of Washington LCR steelhead populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

**Lower Columbia River coho *(Oncorhynchus kisutch)***: Originally part of a larger Lower Columbia River/Southwest Washington ESU, Lower Columbia coho were identified as a separate ESU and listed as threatened on June 28, 2005. The ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers, The twenty-one artificial propagation programs include: the Grays River, Peterson Coho Project, Cowlitz Type-N Coho Program in the upper and lower Cowlitz Rivers, Cowlitz Game and Anglers Coho Program, Friends of the Cowlitz Coho Program, North Fork Toutle River Hatchery, Kalama River Type-N and Type-S Coho Programs, Lewis River Type-N and Type-S

Coho programs, Fish First Wild Coho and Type-N Coho programs, Syverson Project Type-N Coho Program, and Washougal Hatchery Type-N Coho Program (NMFS 2014 79FR20802).

**Status**: Status evaluations of LCR coho status, all based on WLC-TRT criteria, have been conducted since the last BRT status update in 2005 (McElhany et al. 2007, Beamesderfer et al. 2010, LCFRB 2010, Dornbusch and Sihler 2013). All of these evaluations concluded that the ESU is currently at very high risk of extinction. All of the Washington side populations are considered at very high risk, although uncertainty is high because of a lack of adult spawner surveys. The 2005 BRT evaluation noted that smolt traps indicate some natural production in Washington populations, though given the high fraction of hatchery origin spawners suspected to occur in these populations it is not clear that any are self-sustaining (Ford 2011). Since this time WDFW has implemented an ESU wide monitoring program for LCR coho which began in 2010. Preliminary results indicate that natural origin population abundance may be higher than previously thought for certain populations (WDFW, unpublished). Results from the first 3 years of monitoring should be available in the near future. Currently, 21 of the 24 Lower Columbia River coho salmon populations are considered to have a very low probability of persisting over the next 100 years, and none is considered viable (Dornbusch and Sihler 2013). All three strata in the ESU fall significantly short of the WLC TRT criteria for viability.

**Table 2.2.2.3:** Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River coho populations.

| | | Baseline viability | | | | | Prod. | Abundance | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Population | Contribution | A&P | S | D | Net | Obj. | target | Historical | Baseline | Target |
| **Coast** | | | | | | | | | | |
| Grays/Chinook [L] | Primary | VL | H | VL | VL[2] | H | +370% | 3,800 | <50 | 2,400 |
| Eloch/Skam [L] | Primary | VL | H | VL | VL[2] | H | +170% | 6,500 | <50 | 2,400 |
| Mill/Ab/Germ [L] | Contributing | VL | H | L | VL[2] | M | >500% | 2,800 | <50 | 1,800 |
| Youngs (OR) [L] | Stabilizing | --[3] | --[3] | --[3] | VL | VL | --[3] | --[3] | --[3] | --[3] |
| Big Creek (OR) [L] | Stabilizing[2] | --[3] | --[3] | --[3] | VL | VL | --[3] | --[3] | --[3] | --[3] |
| Clatskanie (OR) [L] | Primary[1] | --[3] | --[3] | --[3] | L | VH | --[3] | --[3] | --[3] | --[3] |
| Scappoose (OR) [L] | Primary | --[3] | --[3] | --[3] | M | VH | --[3] | --[3] | --[3] | --[3] |
| **Cascade** | | | | | | | | | | |
| Lower Cowlitz [L] | Primary | VL | M | M | VL[2] | H | +100% | 18,000 | 500 | 3,700 |
| Upper Cowlitz [E, L] | Primary[1] | VL | M | L | VL | H[1] | >500% | 18,000 | <50 | 2,000 |
| Cispus [E, L] | Primary[1] | VL | M | L | VL | H[1] | >500% | 8,000 | <50 | 2,000 |
| Tilton [E, L] | Stabilizing[2] | VL | M | L | VL | VL[2] | 0% | 5,600 | <50 | -- |
| Toutle SF [E, L] | Primary | VL | H | M | VL[2] | H | +180% | 27,000 | <50 | 1,900 |
| Toutle NF [E, L] | Primary | VL | M | L | VL[2] | H | +180% | | <50 | 1,900 |
| Coweeman [L] | Primary | VL | H | M | VL[2] | H | +170% | 5,000 | <50 | 1,200 |
| Kalama [L] | Contributing | VL | H | L | VL[2] | L | >500% | 800 | <50 | 500 |
| NF Lewis [E, L] | Contributing | VL | L | L | VL[2] | L | +50% | 40,000 | 200 | 500 |
| EF Lewis [E, L] | Primary | VL | H | M | VL[2] | H | >500% | 3,000 | <50 | 2,000 |
| Salmon [L] | Stabilizing | VL | M | VL | VL | VL | 0% | na | <50 | -- |
| Washougal [L] | Contributing | VL | H | L | VL[2] | M+ | >500% | 3,000 | <50 | 1,500 |
| Clackamas (OR) [E, L] | Primary | --[3] | --[3] | --[3] | M | VH | --[3] | --[3] | --[3] | --[3] |
| Sandy (OR) [E, L] | Primary | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| **Gorge** | | | | | | | | | | |
| L Gorge (WA/OR) [L] | Primary | VL | M | VL | VL[2] | H | +400% | na | <50 | 1,900 |
| U Gorge (WA) [L] | Primary[1] | VL | M | VL | VL[2] | H | +400% | na | <50 | 1,900 |
| U Gorge/Hood (OR)[E] | Contributing[4] | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |

Source: LCFRB 2010.
L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.
[1] Increase relative to interim Plan.
[2] Reduction relative to interim Plan.
[3] Addressed in Oregon Management Unit plan.
[4] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.
[E] Early run (Type S) coho stock.
[L] Late run (Type N) coho stock.
(Core and Legacy populations not designated by the TRT for coho).

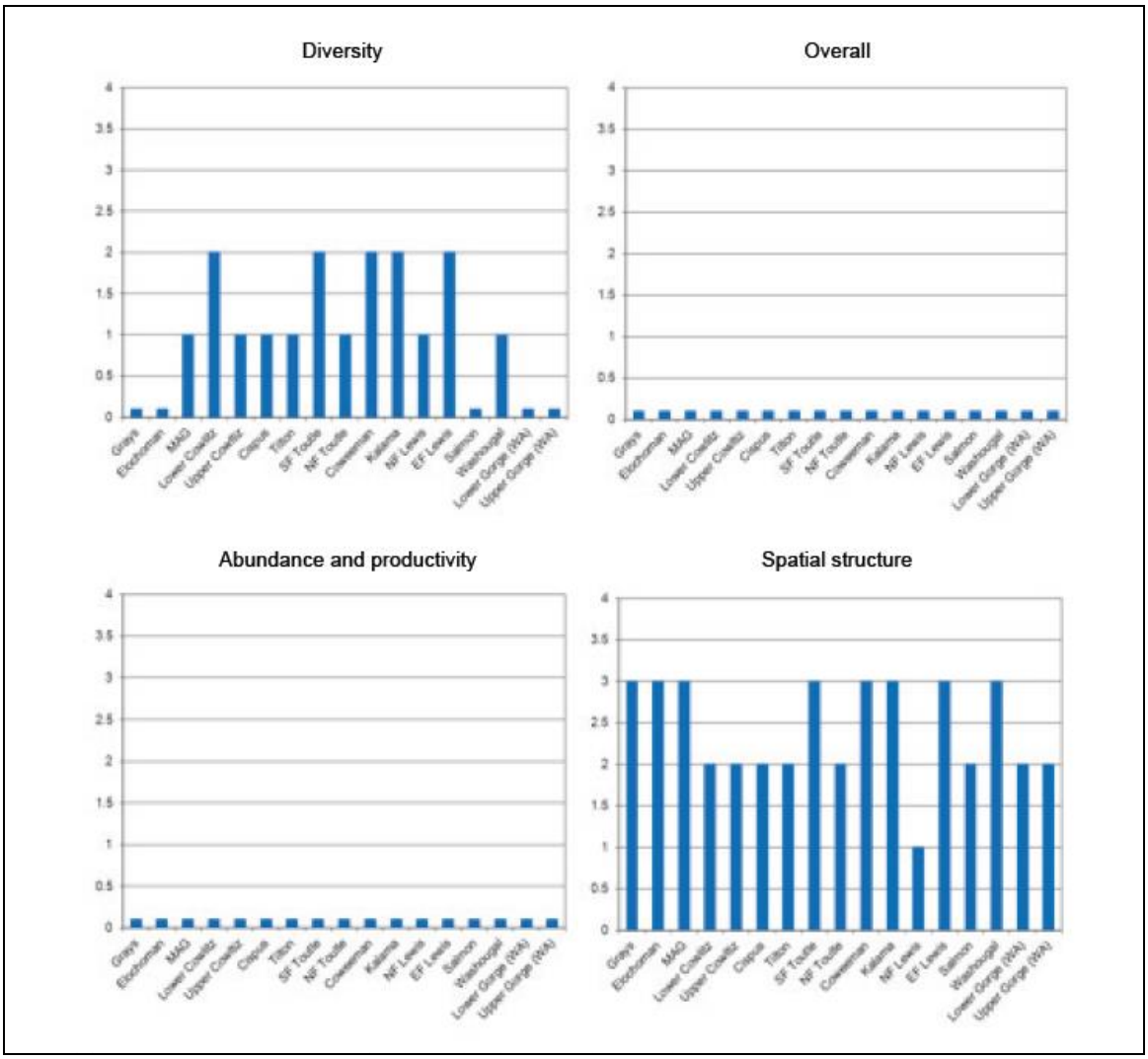


**Figure 2.2.2.3:** Current status of Washington LCR coho populations for the VSP parameters and overall population risk. (LCFRB 2010 recovery plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

**Columbia River chum salmon (*Oncorhynchus keta*)**. ESU includes all naturally spawned populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon, as well as artificial propagation programs at Grays River and Washougal River/Duncan Creek chum hatchery programs (NMFS 2014 79FR20802).

**Status:** A report on the population structure of lower Columbia River salmon and steelhead populations was published by the WLC-TRT in 2006 (Myers et al. 2006). The chum population designations in that report are used in this status update and were used for status evaluations in recent recovery plans by ODFW and LCFRB.

The LCFRB completed a revision recovery plan in 2010 that includes Washington populations of Columbia River chum salmon. This plan includes an assessment of the current status of Columbia River chum populations, which relied and built on the viability criteria developed by the WLC-TRT (McElhany et al. 2006) and an earlier evaluation of Oregon WLC populations (McElhany et al. 2007). This evaluation assessed the status of populations with regard to the VSP parameters of A/P, spatial structure, and diversity (McElhany et al. 2000). The result of this analysis is shown in **Figure 2.2.2.4**. The analysis indicates that all of the Washington populations with two exceptions

are in the overall very high risk category (also described as extirpated or nearly so). The Grays River population was considered to be at moderate risk and the Lower Gorge population to be at low risk. The very high risk status assigned to the majority of Washington populations (and all the Oregon populations) reflects the very low abundance observed in these populations (e.g., <10 fish/year) (Ford 2011). Today, 15 of the 17 populations that historically made up this ESU are so depleted that either their baseline probability of persistence is very low or they are extirpated or nearly so; this is the case for all six of the Oregon populations. Currently almost all natural production occurs in just two populations: Grays/Chinook and the Lower Gorge. All three strata in the ESU fall significantly short of the WLC TRT criteria for viability (Dornbush and Sihler 2013).

**Table 2.2.2.4:** Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River chum populations.

| | | Baseline viability | | | | | Prod. | Abundance | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Population** | **Contribution** | **A&P** | **S** | **D** | **Net** | **Obj.** | **target** | **Historical** | **Baseline** | **Target** |
| **Coast** | | | | | | | | | | |
| Grays/Chinook [C,G] | Primary | VH | M | H | M[1] | VH | 0%[4] | 10,000 | 1,600 | 1,600 |
| Eloch/Skam [C] | Primary | VL | H | L | VL[2] | H | >500% | 16,000 | <200 | 1,300 |
| Mill/Ab/Germ | Primary | VL | H | L | VL | H | >500% | 7,000 | <100 | 1,300 |
| Youngs (OR) [C] | Stabilizing[2] | --[3] | --[3] | --[3] | VL | VL | --[3] | --[3] | --[3] | --[3] |
| Big Creek (OR) [C] | Stabilizing[2] | --[3] | --[3] | --[3] | VL | VL | --[3] | --[3] | --[3] | --[3] |
| Clatskanie (OR) | Primary[1] | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| Scappoose (OR) | Primary[1] | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| **Cascade** | | | | | | | | | | |
| Cowlitz (Fall) [C] | Contributing | VL | H | L | VL | M | >500% | 195,000 | <300 | 900 |
| Cowlitz (Summer) [C] | Contributing | VL | L | L | VL | M | >500% | n/a | n/a | 900 |
| Kalama | Contributing | VL | H | L | VL | M | >500% | 20,000 | <100 | 900 |
| Lewis [C] | Primary | VL | H | L | VL | H | >500% | 125,000 | <100 | 1,300 |
| Salmon | Stabilizing | VL | L | L | VL | VL | 0% | n/a | <100 | -- |
| Washougal | Primary | VL | H | L | VL[2] | H+ | >500% | 18,000 | <100 | 1,300 |
| Clackamas (OR) [C] | Contributing | --[3] | --[3] | --[3] | VL | M | --[3] | --[3] | --[3] | --[3] |
| Sandy (OR) | Primary | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| **Gorge** | | | | | | | | | | |
| L. Gorge (WA/OR) [C,G] | Primary | VH | H | VH | H[1] | VH | 0%[4] | 6,000 | 2,000 | 2,000 |
| U. Gorge (WA/OR) | Contributing | VL | L | L | VL | M | >500% | 11,000 | <50 | 900 |

Source: LCFRB 2010.

L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.

[5] Increase relative to interim Plan.

[6] Reduction relative to interim Plan.

[7] Addressed in Oregon Management Unit plan.

[8] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.

[C] Designated as a historical core population by the TRT.

[G] Designated as a historical legacy population by the TRT.

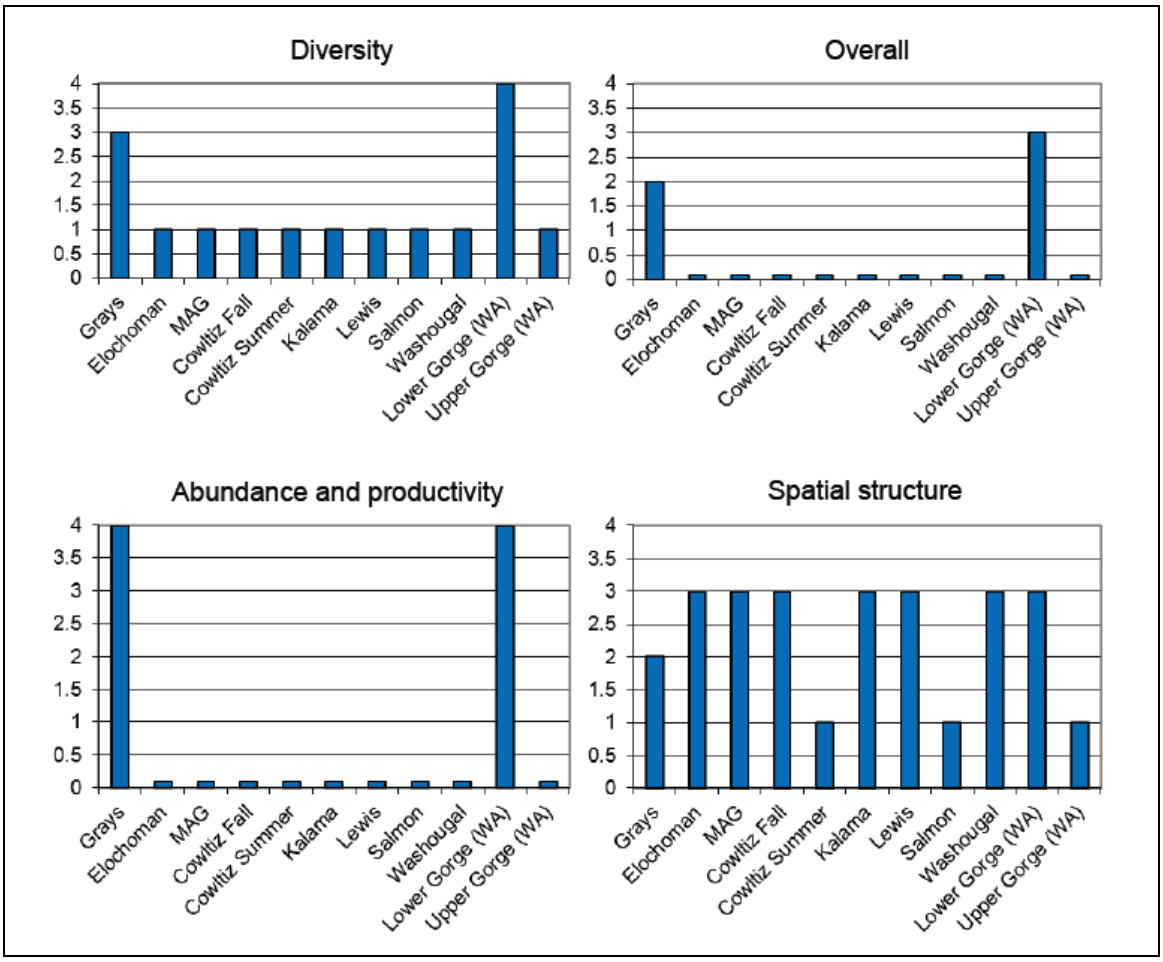


**Figure 2.2.2.4:** Current status of Washington CR chum populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, Chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

### - Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population.

See HGMP section 11.1 for planned M&E. Juvenile coho production estimates is the one measure of production in the Lower Columbia system. See HGMP section 11.1 for planned M&E.

**Table 2.2.2.5:** Lower Columbia River Washington tributary coho smolt production estimates, 1997-2009 (WDFW, Region 5).

| Year | Cedar Creek | Mill Creek | Abernathy Creek | Germany Creek | Cowlitz Falls Dam | Mayfield Dam |
|---|---|---|---|---|---|---|
| **1997** | ----- | ----- | ----- | ----- | 3,700 | 700 |
| **1998** | 38,400 | ----- | ----- | ----- | 110,000 | 16,700 |
| **1999** | 28,000 | ----- | ----- | ----- | 15,100 | 9,700 |
| **2000** | 20,300 | ----- | ----- | ----- | 106,900 | 23,500 |
| **2001** | 24,200 | 6,300 | 6,500 | 8,200 | 334,700 | 82,200 |
| **2002** | 35,000 | 8,200 | 5,400 | 4,300 | 166,800 | 11,900 |
| **2003** | 36,700 | 10,500 | 9,600 | 6,200 | 403,600 | 38,900 |
| **2004** | 37,000 | 5,700 | 6,400 | 5,100 | 396,200 | 36,100 |
| **2005** | 58,300 | 11,400 | 9,000 | 4,900 | 766,100 | 40,900 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **2006** | 46,000 | 6,700 | 4,400 | 2,300 | 370,000 | 33,600 |
| **2007** | 29,300 | 7,000 | 3,300 | 2,300 | 277,400 | 34,200 |
| **2008** | 36,340 | 90,97 | 5,077 | 3,976 | ----- | 38,917 |
| **2009** | 61,140 | 62,83 | 3,761 | 2,576 | ----- | 29,718 |
| **2010** | ----- | ----- | ----- | ----- | ----- | 49,171 |
| **2011** | ----- | ----- | ----- | ----- | ----- | 43,831 |

Source: LCR FMEP Annual Report 2010 and WDFW Data 2012.

**- Provide the most recent 12 year annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.**

**Table 2.2.2.6:** Spring Chinook salmon total spawner abundance estimates in LCR tributaries, 2000-2012.

| Year | Cowlitz | Kalama | Lewis |
|---|---|---|---|
| **2000** | 266 | 34 | 523 |
| **2001** | 347 | 578 | 754 |
| **2002** | 419 | 898 | 498 |
| **2003** | 1,953 | 790 | 745 |
| **2004** | 1,877 | 358 | 529 |
| **2005** | 405 | 380 | 122 |
| **2006** | 783 | 292 | 857 |
| **2007** | 74 | 2,150 | 264 |
| **2008** | 425 | 364 | 40 |
| **2009** | 763 | 34 | 80 |
| **2010** | 711 | 0 | 160 |
| **2011** | 1,359 | 26 | 120 |
| **2012** | 1,359 | 28 | 200 |

Source: Joe Hymer, WDFW Annual Database 2012

**Table 2.2.2.7:** Fall Chinook salmon total spawner abundance estimates in LCR tributaries, 2000-2011[a].

| Year | Elochoman River | Coweeman River[a] | Grays River | Skamokawa Creek | Cowlitz River | Green River (Toutle) | SF Toutle River | Kalama River | EF Lewis River | NF Lewis River | Washougal River |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **2000** | 884 | 424 | 80 | 482 | 2,100 | 1,580 | 204 | 3,877 | 391 | 6,504 | 2,757 |
| **2001** | 230 | 251 | 104 | 3 | 1,979 | 1,081 | 102 | 3,451 | 245 | 4,281 | 1,704 |
| **2002** | 332 | 566 | 390 | 7 | 3,038 | 5,654 | 216 | 10,560 | 441 | 5,518 | 2,728 |
| **2003** | 2,204 | 753 | 149 | 529 | 2,968 | 2,985 | 327 | 9,272 | 607 | 11,519 | 2,678 |
| **2004** | 4,796 | 1,590 | 745 | 2,109 | 4,621 | 4,188 | 618 | 6,680 | 918 | 13,987 | 10,597 |
| **2005** | 6,820 | 1,090 | 387 | 588 | 10,329 | 13,846 | 140 | 24,782 | 727 | 18,913 | 3,444 |
| **2006** | 7,581 | 900 | 82 | 372 | 14,427 | 7,477 | 450 | 18,952 | 1,375 | 17,106 | 6,050 |
| **2007** | 194 | 140 | 99 | 36 | 2,724 | 961 | 30 | 1,521 | 308 | 10,934 | 2,143 |
| **2008** | 782 | 95 | 311 | 253 | 1,334 | 824 | 45 | 2,617 | 236 | 4,268 | 3,182 |
| **2009** | 231 | 147 | 93 | 139 | 2,156 | 1,302 | 66 | 4,356 | 110 | 6,112 | 2,995 |
| **2010** | 1,883 | 1,330 | 12 | 268 | 2,762 | 605 | NE | 3,576 | 314 | 8,908 | 4,529 |
| **2011** | 508 | 2,148 | 353 | 41 | 1,616 | 668 | NE | 10,639 | 334 | 14,033 | 2,961 |

Source: Ron Roler, WDFW Natural Spawn Progress Reports 2012.

* Estimates of total adult and jack fall Chinook. May include fish put upstream of hatchery weirs.

**Table 2.2.2.8:** Wild winter steelhead escapement estimates for select SW Washington DPS populations, current WDFW escapement goals and LCSRP abundance targets.

| Location | Grays River | Elochoman/ Skamokawa | Mill/Abernathy/ Germany |
|---|---|---|---|
| **WDFW Escapement Goal** | **1,486** | **853** | **508** |
| **LCSRP Abundance Target** | **800** | **600** | **500** |
| **2000** | 1,064 | 650 | 380 |
| **2001** | 1,130 | 656 | 458 |
| **2002** | 724 | 370 | 354 |
| **2003** | 1,200 | 668 | 342 |
| **2004** | 1,132 | 768 | 446 |
| **2005** | 396 | 376 | 274 |
| **2006** | 718 | 632 | 398 |
| **2007** | 724 | 490 | 376 |
| **2008** | 764 | 666 | 528 |
| **2009** | 568 | 222 | 396 |
| **2010** | 422 | 534 | 398 |
| **2011** | 318 | 442 | 270 |
| **3-year average** | **436** | **399** | **355** |
| **5-year average** | **559** | **471** | **394** |
| **10-year average** | **697** | **517** | **378** |

Source: WDFW Data 2012

**Table 2.2.2.9:** Wild winter steelhead escapement estimates for select SW Washington DPS populations, current WDFW escapement goals and LCSRP abundance targets.

| Location | Coweeman | SF Toutle | NF Toutle/ Green | Kalama | EF Lewis | Washougal |
|---|---|---|---|---|---|---|
| **WDFW Escapement Goal** | **1,064** | **1,058** | **NA** | **1,000** | **1,243** | **520** |
| **LCSRP Abundance Target** | **500** | **600** | **600** | **600** | **500** | **350** |
| **2000** | 530 | 490 | ---- | 921 | NA | NA |
| **2001** | 384 | 348 | ---- | 1,042 | 377 | 216 |
| **2002** | 298 | 640 | ---- | 1,495 | 292 | 286 |
| **2003** | 460 | 1,510 | ---- | 1,815 | 532 | 764 |
| **2004** | 722 | 1,212 | ---- | 2,400 | 1,298 | 1,114 |
| **2005** | 370 | 520 | 388 | 1,856 | 246 | 320 |
| **2006** | 372 | 656 | 892 | 1,724 | 458 | 524 |
| **2007** | 384 | 548 | 565 | 1,050 | 448 | 632 |
| **2008** | 722 | 412 | 650 | 776 | 548 | 732 |
| **2009** | 602 | 498 | 699 | 1,044 | 688 | 418 |
| **2010** | 528 | 274 | 508 | 961 | 336 | 232 |
| **2011** | 408 | 210 | 416 | 622 | 308 | 204 |
| **3-year average** | **513** | **327** | **541** | **876** | **444** | **285** |
| **5-year average** | **529** | **388** | **568** | **891** | **466** | **444** |
| **10-year average** | **487** | **648** | ***588** | **1,374** | **515** | **523** |

Source: WDFW Data 2012.

* 7-year average for NF Toutle/Green.

**Table 2.2.2.10:** Wild summer steelhead population estimates for LCR populations from 2001 to 2011, current WDFW escapement goals, and LCSRP abundance targets.

| Location | Kalama | EF Lewis | Washougal | Wind |
|---|---|---|---|---|
| **WDFW Escapement Goal** | **1,000** | **NA** | **NA** | **1,557** |
| **LCSRP Abundance Target** | **500** | **500** | **500** | **1,000** |
| **2001** | 286 | 271 | 184 | 457 |
| **2002** | 454 | 440 | 404 | 680 |
| **2003** | 817 | 910 | 607 | 1,096 |
| **2004** | 632 | 425 | NA | 861 |
| **2005** | 400 | 673 | 608 | 587 |
| **2006** | 387 | 560 | 636 | 632 |
| **2007** | 361 | 412 | 681 | 737 |
| **2008** | 237 | 365 | 755 | 614 |
| **2009** | 308 | 800 | 433 | 580 |
| **2010** | 370 | 602 | 787 | 788 |
| **2011** | 534 | 1,084* | 956* | 1,468 |
| **3-year average** | **404** | **829** | **725** | **945** |
| **5-year average** | **362** | **653** | **722** | **837** |
| **10-year average** | **450** | **627** | **652** | **804** |

Source: WDFW Data 2012.
* Preliminary estimates.

**Table 2.2.2.11:** Population estimates of chum salmon in the Columbia River.

| Location | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010[a] | 2011[a] |
|---|---|---|---|---|---|---|---|---|---|---|
| Crazy Johnson Creek | --- | --- | 966 | 1,471 | 3,639 | 759 | 1,034 | 981 | 677 | 2,374 |
| WF Grays River | --- | --- | 9,015 | 1,324 | 1,232 | 1,909 | 800 | 994 | 1,967 | 7,002 |
| Mainstem Grays River | --- | --- | 4,872 | 1,400 | 1,244 | 1,164 | 886 | 750 | 3,467 | 1,848 |
| I-205 area | 3,468 | 2,844 | 2,102 | 1,009 | 862 | 544 | 626 | 1,132 | 2,105 | 4,947 |
| Multnomah area | 1,267 | 1,130 | 665 | 211 | 313 | 115 | 28 | 102 | 427 | 641 |
| St Cloud area | --- | 137 | 104 | 92 | 173 | 9 | 1 | 14 | 99 | 509 |
| Horsetail area | --- | --- | 106 | 40 | 63 | 17 | 33 | 6 | 45 | 183 |
| Ives area[b] | 4,466 | 1,942 | 363 | 263 | 387 | 145 | 168 | 141 | 214 | 162 |
| Duncan Creek[c] | 13 | 16 | 2 | 7 | 42 | 9 | 2 | 26 | 48 | 85 |
| Hardy Creek | 343 | 392 | 49 | 73 | 104 | 14 | 3 | 39 | 137 | 173 |
| Hamilton Creek | 1,000 | 500 | 222 | 174 | 246 | 79 | 114 | 115 | 247 | 517 |
| Hamilton Spring Channel | 794 | 363 | 346 | 84 | 236 | 44 | 109 | 91 | 187 | 324 |
| Grays return[d] | 12,041 | 16,974 | 15,157 | 4,327 | 6,232 | 3,966 | 2,807 | 2,833 | 6,399 | 11,518 |
| I-205 to Bonneville return | 11,351 | 7,324 | 3,959 | 1,953 | 2,426 | 976 | 1,084 | 1,666 | 3,509 | 7,541 |
| Lower Columbia River Total | 23,392 | 24,298 | 19,116 | 6,280 | 8,658 | 4,942 | 3,891 | 4,499 | 9,908 | 19,059 |

Source: Todd Hillson - WDFW Chum Program 2012
[a] Data for 2010 and 2011 is preliminary.
[b] Ives area counts are the carcass tagging estimate plus fish removed for broodstock, except for 2007 and 2008, which is area under the curve.
[c] Totals for Duncan Creek do not include broodstock brought in from mainstem spawning areas, adult trap catch or surveys below monitoring weirs only..
[d] Grays return totals include natural spawners and removed for broodstock.

**- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.**

The proportion of hatchery-origin spawners (pHOS) should be less than 30% of the naturally spawning population per HSRG guidelines (2009). Estimates of pHOS for this program prior to the weir operations were 0.89. See HGMP section 11.1 for planned M&E

Potential hatchery-origin strays from this program into adjacent basins (Grays/Elochoman) are reduced by the use of monitoring weirs (NOAA Section 10(a) Scientific Research Permit #16578) that are in place and operating during the fall Chinook return to trap and remove identified (marked) hatchery fish from the systems.

### 2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of NMFS listed fish in the target area, and provide estimated annual levels of take.

**- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take**.

**Broodstock Program:**

*Broodstock Collection:* Type N coho begin entering the Grays River system in late- September. Spawning peaks in November and December. Coho volitionally enter the ladder and holding pond. Any listed Chinook that would enter the pond during this time are monitored and released upstream of this point. See "take" tables at the end of this document.

*Genetic introgression*: Broodstock for this program was initiated from local coho salmon. Egg-takes are representative of adult arriving throughout the run and the current collection protocol preserves the range timing of the historical coho stock in the system. Most natural spawners in the system are composites and representative of the lower Columbia coho (SaSI 2002). There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the sub-basin. Straying rates are unknown. Indirect take from genetic introgression is unknown.

**Rearing Program:**

*Operation of Hatchery Facilities:* Facility operation impacts include water withdrawal, effluent, and intake compliance. Effluent at outfall areas is rapidly diluted with mainstem flows and operation is within permitted NPDES guidelines (see HGMP sections 4.1 and 4.2). Indirect take from this operation is unknown.

*Disease*: Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the hatchery programs. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*-Chapter 5 (IHOT 1995) have been instrumental in reducing disease outbreaks. Although pathogens occur in the wild and fish might be affected, they are believed to go undetected with predation quickly removing those fish.

In addition, although pathogens may cause post release mortality in fish from hatcheries, there is little evidence that hatchery origin fish routinely infect natural populations of salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986 and Steward and Bjornn 1990). Prior to release, the hatchery population health and condition is established by the Area Fish Health Specialist. This is commonly done one to three weeks pre-release, and up to six weeks on systems with pathogen-free water and little or no history of disease. Indirect take from disease is unknown.

**Release:**

*Hatchery Production/Density-Dependent Effects:* Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can

compete with listed fish. Fish are released as active smolts that will emigrate in order to minimize the effect of the release. Indirect take from density dependent effects is unknown.

*Potential Grays River coho predation and competition effects on listed salmonids and eulachon*: The proposed annual production goal for this program is 150,000 yearlings. Coho are released at 15 fpp (146 mm fl). Due to size differences between coho smolts and fingerling listed stocks, competition is unlikely with different prey items and habitat preferences.

**Table 2.2.3.1:** Peak migration timing and average fork length (mm) of out-migrant juvenile Chinook, coho and steelhead captured in rotary screw traps on Mill, Germany and Abernathy creek, Lower Columbia River, 2008.

| Stream | Chinook | | Coho | | Steelhead | |
|---|---|---|---|---|---|---|
| | Avg Size (mm) | Peak Migration | Avg Size (mm) | Peak Migration | Avg Size (mm) | Peak Migration |
| Mill Cr | 37.0 | Mar 10-Apr 13 | 104.2 | Mar 17-23 | 154.5 | Apr 28-May 4 |
| Germany Cr | 39.8 | Mar 17-23 | 115.3 | May 19-25 | 177.8 | May 12-18 |
| Abernathy Cr | 37.9 | Mar 31 – Apr 6 | 112.1 | May 19-25 | 163.8 | May 12-18 |

Source: Kinsel et al 2009.

Both juvenile and adult salmonids have been documented to feed on eulachon (Gustafson et al. 2010). Predation of eulachon by coho reared in this program may occur, however it is unknown to what degree such predation may occur.

*Residualism*: To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, volitional release strategies, size, and time guidelines.

- Condition factors, standard deviation and co-efficient of variation (CV) are measured throughout the rearing cycle and at release.
- Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize out-of-size fish and programmed to produce smolt size fish at date of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimation ponds.
- Releases from these ponds are volitional with large proportions of the populations moving out initially with the remainder of the population vacating within days or a few weeks.

**Monitoring:**

*Associated monitoring Activities:* WDFW has implemented an expanded monitoring program for Chinook, coho, chum and steelhead populations in the Lower Columbia River (LCR) region of Southwest Washington (WDFW's Region 5) and fishery monitoring in the lower mainstem of the Columbia River. The focus of this expanded monitoring is to 1) gather data on Viable Salmonid Population (VSP) parameters – spawner abundance, including proportion of hatchery-origin spawners (pHOS), spatial distribution, diversity, and productivity, 2) to increase the coded wire tag (CWT) recovery rate from spawning grounds to meet regional standards, and 3) to evaluate the use of PIT tags to develop harvest rates for salmon and steelhead populations. Additionally, key watersheds are monitored for juvenile salmonid out-migrant abundance. Coupled with adult abundance information, these data sets allow for evaluation of freshwater productivity and development of biological reference points, such as seeding capacity. Monitoring protocols and analysis methods utilized are intended to produce unbiased estimates with measurements of precision in an effort to meet NOAA monitoring guidelines (Crawford and Rumsey 2009).

**- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.**

**Table 2.2.3.2:** Disposition of unmarked (no adipose fin-clip) coho returning to the Grays River Hatchery.

| Brood Year | Mortality | Spawned[a] |
|---|---|---|
| **2010** | 0 | 47 |
| **2011** | ------ | ------ |
| **2012** | 0 | 2 |
| **2013** | 1 | 20 |

Source: WDFW Annual Escapement Reports.

**- Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**

See "take" tables at the end of this HGMP.

**- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.**

No situations are expected to occur where take would exceed ESA limits. If significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist, Fish Health Specialist or Area Habitat Biologist who, along with the Hatchery Complex Manager, would determine an appropriate plan and consult with NOAA-NMFS for adaptive management review and protocols.

Handling and release of wild coho in broodstock trapping operations is monitored and take observations have been rare. Any additionally mortality from this operation on a yearly basis would be communicated to Fish program staff for additional guidance.

# 3 SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

## 3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. Hood Canal Summer Chum Conservation Initiative) or other regionally accepted policies (e.g. the NPPC Annual Production Review Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

WDFW has several policies/plans that help inform management decisions regarding the HGMPs currently under review. These policies include:

1. Hatchery and Fishery Reform Policy (Commission Policy C3619)
2. The Conservation and Sustainable Fisheries Plan (draft)
3. The Hatchery Action Implementation Plans (HAIP)
4. Lower Columbia Salmon Recovery Plan (LCSRP)

Descriptions of these policies and excerpts are shown below:

**Policies/Plans – Key Excerpts**

*Hatchery and Fishery Reform Policy: Washington Department of Fish and Wildlife Commission Policy C-3619.* WDFW adopted the Hatchery and Fishery Reform Policy C-3619 in 2009. Its

purpose is to advance the conservation and recovery of wild salmon and steelhead by promoting and guiding the implementation of hatchery reform. The intent of hatchery reform is to improve hatchery effectiveness, ensure compatibility between hatchery production and salmon recovery plans and rebuilding programs, and support sustainable fisheries. WDFW Policy C-3619 works to promote the conservation and recovery of wild salmon and steelhead and provide fishery-related benefits by establishing clear goals for each state hatchery, conducting scientifically defensible-operations, and using informed decision making to improve management. It is recognized that many state operated hatcheries are subject to provisions under *U.S. v Washington* (1974) and *U.S. v Oregon* and that hatchery reform actions must be done in close coordination with tribal co-managers. Washington Fish and Wildlife Commission Policy: POL-C3619.

Guidelines from the policy include:

1. Use the principles, standards, and recommendations of the Hatchery Scientific Review Group (HSRG) to guide the management of hatcheries operated by the Department.
2. Develop watershed-specific action plans that systematically implement hatchery reform as part of a comprehensive, integrated (All-H) strategy for meeting conservation and harvest goals at the watershed and Evolutionarily Significant Unit (ESU)/Distinct Population Segment (DPS) levels. Action Plans will include development of stock (watershed) specific population designations and application of HSRG broodstock management standards.

*Conservation and Sustainable Fisheries Plan* (*CSFP*)*:* The CSFP is a draft plan that has been developed to meet WDFW's responsibilities outlined in the Lower Columbia Salmon Recovery Plan (LCSRP) and address the HSRG suggested solutions and achieve HRSG standards for primary, contributing and stabilizing populations. The plan describes the implementation of changes to hatchery and harvest programs and how they assist in recovery and achieve HSRG guidelines. The draft plan also identifies Viable Salmonid Population (VSP) parameters that will be addressed.

*Hatchery Action Implementation Plans* (*HAIP*)*:* The HAIPs illustrate how WDFW is implementing hatchery programs to incorporate the HSRG guidelines. The plans provide the current programs and explain the future goals.

*Lower Columbia Salmon Recovery Plan* (*LCSRP*)*:* Some sub-basins will be free of hatchery influence and hatchery programs. In other sub-basins, hatchery programs will serve specific conservation and harvest purposes consistent with goals for naturally-spawning populations. The mosaic of programs is designed to ensure that overall each DPS will be naturally self-sustaining.

**Strategies**

1. Reconfigure production-based hatchery programs to minimize impacts on natural populations and complement recovery objectives.
2. Adaptively manage hatcheries to respond to future knowledge, enhance natural production, and improve operational efficiencies.

*Mitchell Act*: This program receives Mitchell Act Funding. Initially passed in 1938, the Mitchell Act is intended to help rebuild and conserve the fish runs, and mitigate the impacts to fish from water diversions, dams on the mainstem of the Columbia River, pollution and logging. The Mitchell Act specifically directs establishment of salmon hatcheries, conduct of engineering and biological surveys and experiments, and installing fish protective devices. It also authorizes agreements with State fishery agencies and construction of facilities on State-owned lands. NMFS has administered the program as of 1970. There are 15 Mitchell Act hatcheries in Washington State; the majority of which are below Bonneville Dam.

The Mitchell Act programs are intended to support Northwest fishing economies – particularly coastal and Native American -- that have relied on Columbia River production both before and after dam construction. Catches of hatchery fish sustain the economies of local communities

while keeping incidental mortalities of ESA-Listed fish at approved levels. Value of hatchery production and benefit to local economies will be further increased by implementing fisheries that increase harvest of hatchery produced fish, as expected through implementation of the LCSRP.

## 3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

*Future Brood Document.* Hatchery salmon and steelhead production levels are detailed in the annual Future Brood Document, a pre-season planning document for fish hatchery production in Washington State for the upcoming brood stock collection and fish rearing season (July 1 – June 30).

See also HGMP section 3.1.

## 3.3 Relationship to harvest objectives.

Total annual harvest is dependent on management response to annual abundance in Pacific Salmon Commission (PSC - U.S./Canada), Pacific Fishery Management Council (PFMC - U.S. ocean), and Columbia River Compact forums. WDFW also has received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the *Fisheries Management and Evaluation Plan* (FMEP), *Columbia River Fish Management Plan* (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process.

### 3.3.1 Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Hatchery coho can contribute significantly to the lower Columbia River gill net fishery; commercial harvest of early coho is constrained by fall Chinook and Sandy River coho management; commercial harvest of late coho is focused in October during the peak abundance of hatchery late coho. A substantial estuary sport fishery exists between Buoy 10 and the Astoria-Megler Bridge; majority of the catch is early hatchery coho, but late hatchery coho harvest can also be substantial.

The Grays River Type-N program was initiated in 2007 (2009 release year), replacing the Type-S coho program. Preliminary harvest data for the Type-N program is available (**Table 3.3.1.1**). Based on an average SAR of 1.85% (**Table 3.3.1.1**), the Type-N program produced an average of 2,775 adults. By comparison, the Type-S program had an average SAR of 1.61, and produced an average of 2,415 adults.

**Table 3.3.1.1:** Grays River Type-N (late fall) coho fishery contributions.

| Brood Years: 2007-2009 | | |
|---|---|---|
| Fishery Years:2010-2012 | | |
| | **Average SAR%**[a] | **1.85** |
| ***Agency*** | ***Non-WA Fishery*** | ***% Total Survival*** |
| CDFO | All | *1.46* |
| ***Agency*** | ***OR Fishery*** | ***% Total Survival*** |
| ODFW | 10- Ocean Troll | *0.13* |
| ODFW | 21- Columbia R. Gillnet | *13.39* |
| ODFW | 40- Ocean Sport | *10.34* |
| ODFW | 45- Estuarine Sport-(Buoy 10) | *1.70* |
| ODFW | 50- Hatchery Escapement [b] | *0.27* |
| ODFW | 54- Spawning Grounds [c] | *0.07* |

| | | |
|---|---|---|
| ODFW | 72- Juvenile Sampling | *0.07* |
| ***Agency*** | ***WA Fishery*** | ***% Total Survival*** |
| WDFW | 10- Ocean Troll | *0.26* |
| WDFW | 15- Treaty Troll | *0.58* |
| WDFW | 22- Coastal Gillnet | *0.26* |
| WDFW | 41- Ocean Sport- Charter | *4.66* |
| WDFW | 42- Ocean Sport- Private | *8.82* |
| WDFW | 43- Jetty Sport | *0.35* |
| WDFW | 45- Estuary Sport | *0.47* |
| WDFW | 46- Freshwater Sport [d] | *20.98* |
| WDFW | 50- Hatchery Escapement | *36.04* |
| WDFW | 50- Hatchery Escapement (Strays) [e] | *0.19* |
| | ***Total*** | ***100.0*** |

Source: RMIS 2014.
Note: Data is preliminary and subject to change.
[a] Average SAR% = (tags recovered/tags released).
[b] Includes recoveries at Big Creek and Klaskanine hatcheries (OR).
[c] Includes recoveries from Dry Creek (OR),
[d] Freshwater Sport based on WDFW Catch Record Card (CRC) data.
[e] Includes recoveries at Forks Creek Hatchery.

## 3.4 Relationship to habitat protection and recovery strategies.

The following processes have included habitat identification problems, priority fixes and evolved as key components to *the Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans* (Volume 1; Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, LCFRB 2010) and the *Lower Columbia River Salmon and Steelhead ESA Recovery Plan* (Dornbusch and Sihler 2013).

*Sub-Basin Planning* - The current Grays River HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Grays River Sub-basin Summary May 17, 2002 and May 2004) is a broad-scale initiative that will provide building blocks of recovery plans by the Lower Columbia Fish Recovery Board (LCFRB) for listed fish and may well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals. In order to assess, identify and implement restoration, protection and recovery strategies, Region 5 staff is involved in fish and wildlife planning and technical assistance in concert through the LCFRB including the role of fish release programs originating from Grays River Hatchery. The Lower Columbia fish Recovery Board (LCFRB) has adopted The *Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans* (Volume 1; Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, December 15, 2004, revised June 6, 2010) with the understanding that Implementation of the schedule and actions for local jurisdictions depends upon funding and other resources.

*Habitat Treatment and Protection* - Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP), which documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

*Limiting Factors Analysis (LFA)* - A WRIA 25 LFA was conducted by the Washington State Conservation Commission (January 2002). The Grays River suffers from severe habitat

degradation (siltation, poor water quality). This is the result of widespread ongoing logging in the watershed. Freshwater and estuarine ecosystems have been degraded by past and present human activities that have reduced the habitat quality, quantity, and complexity. The primary land use activities responsible for these include: road building, timber harvesting, agriculture, and rural development. These upslope and riparian activities have increased sediment, altered woody debris availability and recruitment, increased water temperatures, changed runoff patterns, and reduced river flow.

## 3.5 Ecological interactions.

(1) *Salmonid and non-salmonid fishes or species that could negatively impact the program:* Out-migrant hatchery fish can be preyed upon through the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays, as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons in the Columbia mainstem sloughs, can prey on coho smolts. Mammals that can take a heavy toll on migrating smolts and returning adults include: harbor seals, sea lions, river otters and orcas

(2) *Salmonid and non-salmonid fishes or species that could be negatively impacted by the program:* Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. In addition the program may have unknown impacts on eulachon populations in the basin.

(3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Multiple programs including fall Chinook, coho and steelhead programs are released from the Grays River Hatchery and limited natural production of Chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.).

(4) *Salmonid and non-salmonid fishes or species that could be positively impacted by the program.* Coho smolts can be preyed upon release thru the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can prey on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts and returning adults include: harbor seals, sea lions, river otters and orcas. Except for yearling coho and steelhead, these species may serve as prey items during the emigration through the basin. Hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Hatchery releases can also behaviorally encourage mass emigration of multiple species through the watershed, reducing residency. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including:

a) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998);
b) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and
c) Juvenile salmonids have been observed to feed directly on carcasses (Bilby et al. 1996).

# 4 SECTION 4. WATER SOURCE

## 4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

**Table 4.1.1:** Water sources for the Grays River Hatchery.

| Water Source | Water Right | | Available Water Flow | Avg Water Temp. (F)[a] | Usage | Limitations[b] |
|---|---|---|---|---|---|---|
| | Record/Cert. No. | Permit No. | | | | |
| Unnamed stream (surface) | S2-CV2P754/ 08315 | 11847 | 0.25 cfs | NA | Incubation to hatching and rearing | High water temps from mid-July – Sept.; low flows from mid-June – Sept; summertime pathogens |
| WF Grays River (surface) | S2-CV2P755/ 08312 | 08270 | 9.25 cfs | 34 – 68 | Broodstocking, rearing, acclimation | |
| Well | G2-21976 CWRIS | ----- | 1,280 gpm | 50 - 52 | Incubation to eyeing and rearing | Low summertime flows July - Sept. |

Source: Phinney 2006, WDOE Water Resources Explorer 2014, WDFW hatchery data.

*Grays River Hatchery*. The facility gets its water from three sources: West Fork Grays River, an unnamed creek, and well water. Most of the water is supplied by gravity flow from a river intake. The unnamed creek through the hatchery grounds is seasonal (dry from early summer to late fall); WDFW has determined that it is a non-fish bearing stream therefore of no impact. It provides 200-300 gpm for incubation. The river intake provides 4,500 to 5,000 gpm of surface water for most of the facility's needs. The well provides approximately 500-600 gpm for incubation and rearing. Water rights were obtained in 1949, 1960 and 1974.

*Peterson Coho Project.* Water for this project is supplied from a gravity fed holding tank used for non-potable water from the nearby creek. Creek water is collected for this tank through an upstream intake on the landowner's property.

**NPDES Permits:**

The Grays River Hatchery operates under the "*Upland Fin-Fish Hatching and Rearing*" *National Pollution Discharge Elimination System* (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE).

Discharges from the cleaning treatment system are monitored as follows:

- *Total Suspended Solids* (*TSS*) 1 to 2 times per month on composite effluent, maximum effluent and influent samples.
- *Settleable Solids* (*SS*) 1 to 2 times per week on effluent and influent samples.
- *In-hatchery Water Temperature* - daily maximum and minimum readings.

**Table 4.1.2:** Record of NPDES permit compliance.

| Facility/ Permit # | Reports Submitted Y/N | | | Last Inspection Date | Violations Last 5 yrs | Corrective Actions Y/N | Meets Compliance Y/N |
|---|---|---|---|---|---|---|---|
| | Monthly | Qtrly | Annual | | | | |
| Grays River WAG13-1015 | Y | Y | Y | 9/13/2012 | 2 | N | Y |

Source: Ann West, WDFW Hatcheries Headquarters Database 2013.

**Table 4.1.3:** List of NPDES violations over the last five years (2008-2012).

| Month/ Year | Parameter | Sample Type | Result/ Violation | Permit Limit | Comment | Action |
|---|---|---|---|---|---|---|
| May 2011 | TSS | Drawdown | 237.0 mg/L | 100.0 mg/L | Sample taken late at end of drawdown. Pond difficult to clean prior to release. Sediments from heavy rain. | N/A |
| | TSS | Drawdown | 173.2 mg/L | 100.0 mg/L | | |

Source: Ann West, WDFW Hatcheries Headquarters Database 2013
Note: These violations did not result in non-compliance with NPDES permit.

*Peterson Coho Project.* This is a short-term rearing and off-channel acclimation pond. Feeding and production stays under NPDES guidelines for permitting. The off-channel pond and hatchery facilities meet guidelines which do not require the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit (>20,000 lbs total on site production and > 5,000 lbs of fish feed per month).

### 4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

*Grays River Hatchery*. The intake screens are in compliance with state and federal guidelines (NMFS 1995, 1996), but do not meet the current *Anadromous Salmonid Passage Facility Design criteria* (NMFS 2011). WDFW received a Mitchell Act Grant in 2008 to assess and evaluate a new gravity intake. The assessment and evaluation of the main intake was completed in 2010, which determined that the upper watershed is unstable and to expect bed load movement for the next 100 years. WDFW is currently evaluating options which may include moving production to Beaver Creek Hatchery.

The unnamed creek has an intake and has been determined to be a non-fish bearing, seasonal stream. The stream effluent to the West Fork Grays River is located about 250-yds upstream of the hatchery effluents; the intake structure from which the facility draws water is approximately the same distance (250-yds) from the hatchery building itself and from the confluence with the WF Grays River.

## 5 SECTION 5. FACILITIES

### 5.1 Broodstock collection facilities (or methods).

Broodstock is collected from volitional returns to Grays River Hatchery. In previous years, a temporary weir was placed in the river adjacent to the hatchery, but this practice was discontinued. The trap is operated from September to March. Adult returns to the hatchery negotiate a five-step ladder to a "V"-trap, into a small holding area. During peak trapping, fish pass through the holding area to the main collection channel. Fish are sorted weekly by a crowder and brail operation, or more often (as needed) during peak return.

## 5.2 Fish transportation equipment (description of pen, tank truck, or container used).

**Table 5.2.1:** Transportation equipment available at Grays River Hatchery.

| Equipment Type | Capacity (gallons) | Supp. Oxygen (y/n) | Temp. Control (y/n) | Norm. Transit Time (minutes) | Chemical(s) Used | Dosage (ppm) |
|---|---|---|---|---|---|---|
| Flatbed truck w/ tank | 500 | Y | N | n/a | None | NA |
| Tanker truck | 1,100 | Y | N | n/a | None | NA |
| Tanker truck | 1,100 | Y | N | n/a | None | NA |

Adults are not transported for this program.

Juveniles are moved from the raceways to the rearing pond after mass-marking, usually with the flatbed truck with tank, although one of the tanker trucks may be used.

## 5.3 Broodstock holding and spawning facilities.

**Table 5.3.1:** Adult holding/spawning facilities available at Grays River Hatchery.

| Ponds (No.) | Pond Type | Volume (cu. ft.) | Length (ft.) | Width (ft.) | Depth (ft.) | Available Flow (gpm) |
|---|---|---|---|---|---|---|
| 1 | Small concrete holding area (top of ladder) | 480 | 20 | 12 | 2.0 | 450-800 |
| 2 | Concrete holding ponds | 12,000 | 60 | 40 | 5.0 | 450-800 |
| 1 | Concrete/wood picket collection channel | 1,540 | 55 | 8 | 3.5 | 450-800 |
| 2 | Concrete kill bins | 81 | 18 | 3 | 1.5 | 200-300 |
| 1 | Wood picket green pen | 384 | 16 | 8 | 3 | 300-600 |

Adults volitionally enter the collection channel via a fish ladder. Spawning areas are located at the head end of the ponds/collection channel with covered kill bins. Fish are sorted weekly by a crowder and brail operation, or more often (as needed) during peak returns. All hatchery fish in surplus of collection needs are provided to food banks or nutrient enhancement. Wild fish not needed for integration are returned to stream.

## 5.4 Incubation facilities.

**Table 5.4.1:** Incubation vessels available at Grays River Hatchery.

| Type | Number | Volume (cu. ft.) | Length (ft.) | Width (ft.) | Depth (ft.) | Flow (gpm) | Loading (eggs/unit) |
|---|---|---|---|---|---|---|---|
| Vertical Stack Tray Units (8 trays each) | 128 half stacks (1024 trays) | 10.7 | 2.0 | 2.1 | 2.7 | 3-5 | 49,000-70,000 |
| Deep Troughs | 2 | 29.4 | 14.0 | 1.3 | 1.6 | 10-15 | 100,000-650,000 |
| Shallow Troughs | 2 | 8.7 | 15.0 | 0.6 | 1 | 6-8 | 20,000-120,000 |
| Freestyle Deep Troughs | 4 | 9.0 | 2.6 | 1.7 | 2.1 | 10-15 | 100,000-450,000 |

Eggs are started in the deep troughs; once eyed, they are transferred to the vertical tray incubators.

**Table 5.4.2:** Incubation vessels available at Peterson Coho Project site.

| Type | Number | Volume (cu. ft.) | Length (ft.) | Width (ft.) | Depth (ft.) | Flow (gpm) | Loading (eggs/unit) |
|---|---|---|---|---|---|---|---|
| Vertical Stack Tray Units (8 trays each) | 1 half stacks (8 trays) | 10.7 | 2.0 | 2.1 | 2.7 | 3-5 | 49,000-70,000 |

*Peterson Coho Project.* Eyed-eggs are transferred from Grays River Hatchery to the rearing site near Knappton, and are incubated in vertical half stack trays.

## 5.5 Rearing facilities.

**Table 5.5.1:** Rearing facilities available at Grays River Hatchery.

| Ponds (No.) | Pond Type | Volume (cu. ft.) | Length (ft.) | Width (ft.) | Depth (ft.) | Flow (gpm) | Max. Flow Index | Max. Density Index |
|---|---|---|---|---|---|---|---|---|
| 10 | Concrete Raceways | 4,800 | 80 | 20 | 3.0 | 300 | 1.875 | 0.30 |
| 1 | Earthen Pond | 95,722 | n/a | n/a | n/a | 4,200 | 2.10 | 0.09 |
| 2 | Concrete holding ponds | 12,000 | 60 | 40 | 5.0 | 450-800 | 1.950 | 0.30 |
| 2 | Intermediate Raceways | 96 | 16 | 3 | 2 | 10-50 | 1.73 | 0.30 |
| 3 | Intermediate Raceways | 106.8 | 16 | 2.5 | 2.7 | 10-50 | 1.73 | 0.30 |

In addition to the standard raceways and the earthen pond, the adult holding ponds may double as a juvenile rearing/release container.

*Peterson Coho Project.* Rearing takes place in a 96 cu. ft. intermediate rearing trough donated by WDFW.

## 5.6 Acclimation/release facilities.

*Grays River Hatchery.* Fish from the on-station program are force-released after dark from the earthen pond (see **Table 5.5.1**).

*Peterson Coho Project.* Fish are force-released after dark from the intermediate raceway directly into the creek used for the project's water supply. Release site in the creek is approx. 250-yds upstream from its confluence with the Columbia River.

## 5.7 Describe operational difficulties or disasters that led to significant fish mortality.

*Grays River Hatchery.* Grays River Hatchery has problems with shells of eyed-eggs on well water not breaking down to allow hatching. Incubation water is used from a seasonal unnamed creek adjacent to the hatchery and has alleviated this problem.

Flooding and associated debris and sediments chronically affect fish production at this facility. This typically happens during sensitive stages of incubation, which can result in egg loss.

*Peterson Coho Project.* The site has some potential intake issues during extremely low water due to freezing events

## 5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

A prolonged loss of hatchery water supply would result in catastrophic loss of all rearing units, with incubation and the raceways being most vulnerable. Under a temporary cessation of the surface water supply, water can be re-directed from other supply sources as first pass or re-use to the units. Hatchery is staffed 24/7 and ready to react to system failure and WDFW has emergency procedures and plans in place. All systems are alarmed to alert us of failure.

IHOT fish health guidelines are followed. WDFW fish health specialists conduct inspections monthly and problems are managed promptly to limit mortality and reduce possible disease transmission. In the event of possible virus outbreak, WDFW facilities follow very strict disinfection procedures and comprehensive lab analysis of all egg-takes for culling, if needed.

# 6 SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

**Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.**

## 6.1 Source.

Adults returning to Grays River Hatchery. Natural-origin fish (adipose intact) incorporation into the broodstock will be maximized to allow for integration of the on-station program.

## 6.2 Supporting information.

### 6.2.1 History.

*Grays River Hatchery*. The on-station program initially used Type-S coho, and provided up to 500,000 yearlings for the Deep River Net Pen SAFE coho program in the 1990s. Production of the Type-S stock for on-station release was discontinued with the 2006 brood (released in 2008), although Grays River Type-S stock continued to be used for Deep River Net Pen program until brood year 2008 (last releases in 2010 – see Deep River Net Pen SAFE Coho HGMP). The Grays River Type-N coho broodstock was largely founded from native coho salmon from the Grays-Elochoman watershed. Brood years 2008 and 2009 were provided from the Elochoman watershed.

*Peterson Coho Project.* This project was initiated with the goal of planting more Grays River chum in Lower Columbia tributaries. As a trial run, Type-N Coho from Grays River were shipped to this project as eyed eggs in 2010. This project, utilizing Type-N coho is on-going, although in the future, this stock will be replaced with Grays River wild chum.

### 6.2.2 Annual size.

*Integrated program.* Around 92 adult pairs, not including jacks, are needed to achieve the established egg-take goal of 250,000 (FBD 2014) for the on-station program. This is based on an average fecundity of around 3,000 eggs/female and a pre-spawning mortality of 10%.

*Segregated program.* A total of around 18 hatchery-origin adult pairs are needed to achieve the egg-take goal of 50,000 collected for the Peterson Coho Project enhancement co-op program.

### 6.2.3 Past and proposed level of natural fish in broodstock.

Coho production at the Grays River Hatchery have been mass-marked since brood year 1995, release year 1997. The Type-N coho production has always operated as an integrated program.

### 6.2.4 Genetic or ecological differences.

The broodstock is derived from stock returning to the sub-basin. There are no known genotypic, phenotypic, or behavioral differences between either the hatchery or natural stocks in the sub-basin. This broodstock was founded from Elochoman late-returning (Type-N) coho.

### 6.2.5 Reasons for choosing.

Locally available stock. This production is designed to supplement Type-N coho escapement to the Grays River, while providing harvest opportunities in the sub-basin, lower Columbia mainstem and tributaries, and Washington and Oregon coastal fisheries.

## 6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

- Natural spawners will be integrated into the broodstock to represent the natural Type-N coho run throughout the season.

- Hatchery program fish are mass-marked.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the sub-basin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish encountered during the broodstock collection process will be returned directly to the river or passed into the upper watershed, with minimal handling and holding time.
- Any observed mortalities will be reported in the WDFW Hatcheries Headquarters Database.

# 7 SECTION 7. BROODSTOCK COLLECTION

## 7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Adults returning to the Grays River Hatchery.

## 7.2 Collection or sampling design.

Type-N coho are collected each year from the run at large reaching the Grays River Hatchery from October through December. Broodstock are collected throughout the entire run to maintain run timing for the population. Capture efficiency is 100% for fish volunteering to the trap, which is operated from September to March.

The program will collect NOBs that volunteer to the Grays River Hatchery and retain all unmarked adult coho until spawning begins and continue to collect potential NOBs and HOBs throughout the run (October-December). Other means of NOB collection (e.g., hook and line, seining, mining eggs from redds) may be examined in the future if hatchery volunteers continue to be fewer than HSRG recommendations. All fish collected will be wanded for coded-wire tag recovery; stray DITs detected will be excluded from the broodstock.

## 7.3 Identity.

Coho produced from this facility have been released mass-marked with an adipose fin-clip (AD) since 1995. A portion of the on-station releases (~30%) are also released AD+coded-wire tagged (CWT).

## 7.4 Proposed number to be collected:

### 7.4.1 Program goal (assuming 1:1 sex ratio for adults):

See HGMP section 6.2.2.

### 7.4.2 Broodstock collection levels for the last twelve years (e.g. 2008-13), or for most recent years available:

**Table 7.4.2.1:** Broodstock collection levels, Grays River Type-N Coho program.

| Brood Year | Marked | | | Unmarked | | |
|---|---|---|---|---|---|---|
| | Females | Males | Jacks | Females | Males | Jacks |
| **2010** | 73 | 76 | 4 | 27 | 20 | 0 |
| **2011** | 258 | 250 | 15 | 0 | 0 | 0 |
| **2012** | 237 | 235 | 13 | 0 | 2 | 0 |
| **2013** | 104 | 98 | 8 | 7 | 13 | 0 |

Source: WDFW Hatcheries Headquarters Database 2014.

### 7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

Hatchery-origin coho in surplus of broodstock needs will be surplused to food banks or used as nutrient enhancement. All hatchery-identified coho are removed from the system to maintain desired pHOS levels.

### 7.6 Fish transportation and holding methods.

Adults are not transported for this program.

### 7.7 Describe fish health maintenance and sanitation procedures applied.

The adult holding area is separated from all other hatchery operations. Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning. Spawning implements are rinsed with an iodophor solution, and spawning area and implements are disinfected with iodophor solution at the end of the spawning day.

### 7.8 Disposition of carcasses.

Spawned carcasses are used for system nutrient enhancement.

### 7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Proper trap operation and fish handling techniques are followed. Out-of-basin transfers are limited. Broodstock are collected throughout the return period. Broodstock collection procedures quickly identify non-target fish encountered; natural-origin fish not used in the program are immediately released.

## 8 SECTION 8. MATING

**Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously**.

### 8.1 Selection method.

Representative portions of the run are randomly selected from fish returning late-October through mid-December. Spawning can occur over a period of weeks, depending on adult returns and broodstock goals. All spawning is conducted during the month of December.

### 8.2 Males.

A ratio of 1:1 males to females is used. Jack coho salmon (2-year old) are incorporated into the broodstock as males at a minimum of 5% of the total spawning population.

### 8.3 Fertilization.

Agency spawning guidelines are closely followed (Seidel 1983). Fertilization occurs at a 1:1 ratio (females/males). Gametes for 1:1 fertilization will not be pooled prior to mixing. All available ripe unmarked fish are crossed at a 1:1 ratio with ripe adipose fin clipped fish; if only WxW fish are available, spawners are crossed at 1:1 ratio. Milt is mixed with green eggs with the ovarian fluid. Water hardening procedures with iodophor are followed after twenty minutes. Iodophor solution is used as rinse that is applied to hands and spawning implements per spawning. Iodophor foot baths are located at entrance to incubation room. Generally, sixty ovarian fluid and kidney/spleen samples are collected from female spawners to test for the presence of viral pathogens. Unmarked fish not used for integration needs are released upstream of the hatchery.

### 8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

### 8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

- Mating cohorts are randomly selected.
- Protocols for population size, fish health disinfection and genetic guidelines followed.
- Spawn all collected mature broodstock if possible without regard to age, size, color or other physical characteristics. If not spawning all collected mature adults over the season, apply the same rationale to individual spawn days.
- Randomize mating and avoid selectivity beyond ripeness on a given spawn day.
- Use one male to one female as much as possible in order to ensure an equal genetic contribution.
- Do not mix milt from multiple males and add to eggs (pooling prior to mixing) in order to eliminate disproportionate genetic male contributions.
- Do not re-use males except as part of specific spawning protocols. A given male should be used as the first mate for only one female total.

## 9 SECTION 9. INCUBATION AND REARING -Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

### 9.1 Incubation:

#### 9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

**Table 9.1.1.1:** Survival rates (%) from egg-take to ponding, Grays River Type-N coho.

| Brood Year | Egg Take | % Egg Survival | |
|---|---|---|---|
| | | Green-to-Eyed | Eyed Egg-to-Ponding |
| **2008** | 300,000 | 93.7 | 95.8 |
| **2009** | 295,000 | 94.9 | 92.5 |
| **2010** | 300,000 | 97.9 | 90.6 |
| **2011** | 785,000 | 90.6 | 97.2 |
| **2012** | 758,400 | 96.0 | 98.4 |
| **2013** | 333,000 | 94.2 | 96.2 |

Source: WDFW Headquarters Database 2014.
Note: Eggs received from Elochoman Hatchery in 2008 and 2009.

**Table 9.1.1.2:** Type-N coho eyed-egg transfers to the Peterson Coho Project.

| Brood Year | Number Transferred |
|---|---|
| **2010** | 10,000 |
| **2011** | 20,000 |
| **2012** | 40,000 |
| **2013** | 40,000 |

Source: WDFW Hatcheries Headquarters Database 2014.

*Peterson Coho Project.* Up to 40,000 eyed-eggs may be transferred to the Peterson Coho Project for incubation and rearing. Eggs are transported in coolers wrapped in wet burlap bags. Transport time is around 35 minutes.

### 9.1.2 Cause for, and disposition of surplus egg takes.

In the event that egg survival is higher than expected, WDFW Regional Managers will be contacted for instructions for disposition of the surplus in accordance with Regional policy and guidelines set forth in management plans/agreements and ESA permits.

### 9.1.3 Loading densities applied during incubation.

Eggs are placed in freestyle deep troughs to the eye stage then moved to stack incubators for hatching. Removal of dead eggs, accurate enumeration and loadings are adjusted during this time (see HGMP section 5.4 for load criteria). WDFW follows *Integrated Hatchery Operations Team* (IHOT) species-specific incubation recommendations for water quality, flows, temperature, substrate, and incubator capacities.

Type-N coho eggs range in size from 1,550 eggs/lb to 1,650 eggs/lb. Eggs are loaded at 7,000-7,500 eggs (approximately 4.5 lbs) per tray.

### 9.1.4 Incubation conditions.

IHOT species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities. Incubation water temperature is monitored by digital thermometer and recorded. Temperature units (TU) are tracked for embryonic development.

*Grays River Hatchery.* After weighing, eyed-eggs are placed in trays with a Vexar® substrate. Eyed-eggs on well water have experienced difficulty in shells not breaking down during hatching, which can plug receptacles. If this condition occurs, eggs can be incubated on water from a seasonal unnamed creek adjacent to the hatchery. Flow rate through the trays is 4 gpm; well water temperatures are a constant 51°F, while the creek temperatures will range from 45-50°F. Dissolved oxygen is a little higher for the creek water, but ranges around 9-11 ppm. There is very little silt: only a small percentage of creek water is used, and creek water is not used during flood events. Siltation is controlled with rodding, as needed.

*Peterson Coho Project.* Eyed-eggs are incubated in vertical trays on gravity water supplied from the nearby creek. Creek water used for incubation typically runs clean, with temperatures ranging from 45 to 52°F. Trays are cleaned by rodding, as needed, during high water conditions.

### 9.1.5 Ponding.

*Grays River Hatchery.* Fry are typically ponded to the raceways in early-March, when the yolk slit is closed to approximately 1-mm wide (approximately 1,650 TUs) or KD factor (95% yolk absorption).

*Peterson Coho Project.* Once hatched, fry are ponded and reared in an intermediate raceway donated by Elochoman Hatchery. Fed fingerlings (~200 fpp) are adipose fin-clipped prior to release in early-May

### 9.1.6 Fish health maintenance and monitoring.

Fish health is continuously monitored in compliance with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). Staff conducts daily inspection, visual monitoring and sampling from eye, fry, fingerling and sub-yearling stages. As soon as potential problems are seen, these concerns are immediately communicated to the WDFW fish health specialist. In addition, fish health specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission. Disease treatment varies with the pathogen encountered, but is generally antibiotic in nature for bacterial infections and bath or drip treatments with chemotheraputants for external infections.

See also **Attachment 1** for health monitoring information.

### 9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

- IHOT and WDFW fish health guidelines followed.
- Multiple units are used in incubators.
- Splash curtains can isolate incubators.
- Temperature, dissolved oxygen, and flow are monitored.
- Dead eggs are discarded in a manner that prevents disease transmission.

## 9.2 Rearing:

### 9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (2008-13), or for years dependable data are available.

**Table 9.2.1.1:** Survival rates (%) from ponding to release, Grays River Type-N coho.

| Brood Year | % Survival | |
|---|---|---|
| | Fry-to-Sub-yearling | Sub-yearling-to-Smolt |
| **2008** | 96.0 | 99.2 |
| **2009** | 98.3 | 90.2 |
| **2010** | 99.5 | 93.6 |
| **2011** | 97.7 | 94.1 |
| **2012** | 99.4 | 97.7 |
| **2013** | NA | NA |

Source: WDFW hatchery records.
NA – Not available

### 9.2.2 Density and loading criteria (goals and actual levels).

Loading and density levels at WDFW hatcheries conform to standards and guidelines set forth in *Fish Hatchery Management* (Piper et. al. 1982), the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). IHOT standards are followed for water quality, alarm systems, predator control measures to provide the necessary security for the cultured stock, loading and density.

Densities are kept at or below 3.3 lbs /gpm and 0.3 lbs /cu ft. before the last loading reduction in the fall of the year. Trough maximum loading is 40 lbs at 12 gpm (3.33 lbs/gpm). Tank and raceway maximum loading for early rearing is 132 lbs for the tanks at 40 gpm (3.3 lbs/gpm) and 800 lbs per raceway at 300 gpm.(2.66 lbs/gpm). The final loading per raceway is approximately 3,200 lbs. at 300 gpm (10.6 lbs/gpm).

### 9.2.3 Fish rearing conditions

**Table 9.2.3.1:** Monthly average surface water temperature (°F) at Grays River Hatchery.

| Month | Average Water Temperature (ºF) |
|---|---|
| **January** | 42 |
| **February** | 43 |
| **March** | 43 |
| **April** | 46 |
| **May** | 51 |
| **June** | 52 |

| | |
|---|---|
| **July** | 59 |
| **August** | 60 |
| **September** | 56 |
| **October** | 49 |
| **November** | 47 |
| **December** | 41 |

Source: WDFW Hatchery Records 2014.

Fish are reared on river water. Temperature, dissolved oxygen (DO) and pond turn-over rate are monitored and recorded daily during fish rearing; water temperatures during the rearing cycle range from 63°F to 34°F. Ponds are vacuum-cleaned regularly, generally weekly, to remove settleable solids, unused feed and feces, and broom-cleaned as needed to ensure proper cleanliness. Predator netting over the rearing ponds minimize predation. All ponds are pressure washed between broods.

Fish are mass-marked in April when they are about 250 fpp.

### 9.2.4 Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

**Table 9.2.4.1:** Monthly fish growth information by length (mm), weight (fpp), condition factor and growth rate, collected during rearing, Grays River Type-N coho.

| Rearing Period | Length (mm) | Weight (fpp) | Growth Rate |
|---|---|---|---|
| March | 45 | 500 | 0.64:1 |
| April | 57 | 250 | 0.70:1 |
| May | 64 | 175 | 0.80:1 |
| June | 75 | 110 | 0.86:1 |
| July | 85 | 75 | 0.94:1 |
| August | 94 | 55 | 0.98:1 |
| September | 105 | 40 | 1:1 |
| October | 108 | 35 | 1:1 |
| November | 112 | 32 | 1:1 |
| December | 115 | 30 | 1.05:1 |
| January | 120 | 27 | 1.15:1 |
| February | 125 | 24 | 1.1:1 |
| March | 134 | 19 | 1:1 |
| April | 146 | 15 | 1:1 |

Source: WDFW Hatchery Records.

### 9.2.5 Indicate monthly fish growth rate and energy reserve data (average program performance), if available.

See HGMP section 9.2.4. No energy reserve data available.

### 9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Fish are given variety of diet formulations including starter, crumbles and pellets; the food brand used may vary, depending on cost and vendor contracts. Feeding frequencies varies depending on

the fish size and water temperature, and usually begin at 8 feedings/7 days a week, and end at 1 feeding/3 days a week. Feed rates vary from 1.0% to 2.5% B.W./day. The overall season feed conversion ratio has averaged approximately 1:1.

### 9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

*Monitoring.* Policy guidance includes: *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995). A fish health specialist inspects fish monthly and checks both healthy and presence of symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted (see **Attachment 1** for Fish Health monitoring history).

*Disease Treatment.* As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Mortality is collected and disposed of at a landfill. Fish health and/or treatment reports are kept on file.

*Sanitation.* All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Mortalities are collected and disposed of at a landfill. Fish Health and/or treatment reports are kept on file (see **Attachment 1** for Fish Health monitoring history).

### 9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

Gill ATPase activity is not measured. Fish size at release time is critical to the readiness for migration. The migratory state of the release population is determined by fish behavior. Aggressive screen and intake crowding, swarming against sloped pond sides, a leaner (0.80 – 0.90) condition factor (K), a silvery physical appearance and loose scales during feeding events are signs of smolt development. Surface water from the West Fork Grays is used for fish rearing, and provides a natural water temperature profile.

### 9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

Not applicable.

### 9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

See HGMP sections 5.8, 6.3, 7.9 and 9.1.7.

# 10 SECTION 10. RELEASE

**Describe fish release levels, and release practices applied through the hatchery program**.

## 10.1 Proposed fish release levels.

**Table 10.1.1**: Proposed release levels (maximum number), Grays River Type-N coho.

| Age Class | Maximum Number | Size (fpp) | Release Date | Location |
|---|---|---|---|---|
| **Yearling** | 150,000 | 15.0 | May | Grays |
| **Fry** | 39,000 | 200.0 | April/May | Columbia mainstem |

Source: WDFW Future Brood Document 2014.
Note: 15 fpp = 146 mm fork length (fl)
200 fpp = 61.6 mm fl

## 10.2 Specific location(s) of proposed release(s).

| | | |
|---|---|---|
| **Stream, river, or watercourse:** | On-station | WF Grays River (WRIA 25.0130) |
| | Peterson Project | Mainstem Columbia |
| **Release point:** | On-station | RKm 3.2 Tributary to Grays River (WRIA 25.0093) at RKm 37 |
| | Peterson Project | N 46.271072 W 123.830281, on an unnamed tributary to the Columbia River |
| **Major watershed:** | Grays | |
| **Basin or Region:** | Columbia River Estuary | |

## 10.3 Actual numbers and sizes of fish released by age class through the program.

**Table 10.3.1:** Number of yearlings released, size, CVs and release date, by age and year, Grays River Hatchery Type-N coho on-station releases.

| Release Year | Type-S | | | | Type-N | | | |
|---|---|---|---|---|---|---|---|---|
| | Number | Avg Size (fpp) | CV | Date | Number | Avg Size (fpp) | CV | Date |
| **2002** | 154,107 | 10.5 | 5.30 | April 30 | ----- | ----- | ----- | ----- |
| **2003** | 153,000 | 12.0 | 5.00 | May 15 | ----- | ----- | ----- | ----- |
| **2004** | 157,000 | 10.0 | 6.50 | May 1 | ----- | ----- | ----- | ----- |
| **2005** | 146,000 | 11.0 | 7.30 | May 1 | ----- | ----- | ----- | ----- |
| **2006** | 156,302 | 12.0 | 8.70 | May 1 | ----- | ----- | ----- | ----- |
| **2007** | 157,500 | 12.0 | 4.80 | May 1 | ----- | ----- | ----- | ----- |
| **2008** | 132,188 | 11.5 | 7.50 | May 1 | ----- | ----- | ----- | ----- |
| **2009** | Program Discontinued | | | | 158,000 | 12.8 | n/a | May 4 |
| **2010** | | | | | 153,000 | 11.0 | 7.60 | May 3 |
| **2011** | | | | | 155,000 | 13.0 | 8.97 | May 1 |
| **2012** | | | | | 163,000 | 16.0 | 7.51 | May 1 |
| **2013** | | | | | 165,000 | 15.8 | 6.42 | May 1 |
| **Average** | **150,871** | **11.3** | **6.44** | | **158,800** | **13.7** | **7.63** | |

Source: WDFW Hatcheries Headquarters Database 2014.
Notes: 10 fpp = 167 mm fork length (fl); 12 fpp = 157 mm fl; 15 fpp = 146 mm fl; 16 fpp = 143 mm fl
Type-N coho released in 2010 and 2011 were Elochoman stock.

## 10.4 Actual dates of release and description of release protocols.

Yearlings are force-released in around May 1. See **Table 10.3.1** for actual release dates.

## 10.5 Fish transportation procedures, if applicable.

*On-station program.* Juvenile fish are not transported; fish are released on-station.

*Peterson Coho Project.* Juvenile fish are not transported; fish are released on-station.

## 10.6 Acclimation procedures (methods applied and length of time).

*On-station program.* Fish are reared and acclimated on river water their entire time at Grays River Hatchery. Yearlings are released directly from the ponds into the WF Grays River.

*Peterson Coho Project.* Fish are reared and acclimated on-site, on the same creek water as used for incubation. Fry are released into the creek in May, at approximately 200 fpp.

## 10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

**Table 10.7.1:** Marks applied, by brood year, age class and mark-type, Grays River Type-N coho releases.

| Brood Year | Age Class | Mark Type | |
|---|---|---|---|
| | | AD-only | AD+CWT |
| 2014 | Fry | 39,000 | 0 |
| | Yearlings | 105,000 | 45,000 |

Source: FBD 2014.

Fish have been 100% mass-marked (adipose fin-clipped) since 1998. In addition, ~30% of the on-station production is released AD + coded-wire tag (AD+CWT) to help determine origin and straying rates.

Snouts collected from the adipose fin-clipped adults are dissected, recovered and read at the WDFW CWT Lab in Olympia. Scale samples are read at WDFW Headquarters Olympia to verify hatchery- or natural-origin. CWT data is reported annual to RMIS.

## 10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

The program guidelines for annual broodstock/egg-take collection are managed to prevent any surpluses, and maintained within the ±5% guideline. In the event of surplus >10%, WDFW Regional Managers will in accordance with regional policy and guidelines set forth in management plans/agreements and ESA permits, and after consultation with NMFS, instruct hatchery staff for disposition of the surplus.

## 10.9 Fish health certification procedures applied pre-release.

All fish are examined for the presence of "reportable pathogens" as defined in the P*acific Northwest Fish Health Protection Committee* (PNFHPC) disease control guidelines, within three weeks prior to release.

Fish transfers into the sub-basin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.

Prior to release, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to 6 weeks on systems with pathogen-free water and little or no history of disease. Prior to this examination, whenever abnormal behavior or mortality is observed, staff also contacts the Area Fish Health Specialist. The fish specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006) and IHOT guidelines.

## 10.10 Emergency release procedures in response to flooding or water system failure.

Hatchery staff will make every attempt to keep the fish alive and healthy throughout the entire rearing-release cycle; all appropriate resource managers from the Complex level to the Federal level will be informed of the actions taken.

*Adult Holding*: Broodstock are held in the concrete holding ponds at the Grays River Hatchery prior to spawning. The holding ponds are supplied by gravity-fed Grays River water; any disruption to the water supply to the ponds would be detected by an alarm system. The hatchery staff would have at least three rescue options.

1) Depending upon stream conditions, pumps could be placed into Grays River until the water supply to the pond is restored.
2) The pumps could be placed in nearby raceways or to the earthen pond.
3) If none of the above locations are suitable, the fish could be released into the river.

*Spawning and incubation-to-fry stage*: In the event of a failure in the gravity pipeline disrupts the water flow to the units:

1) If the eggs have not hatched, each vetical tray would be de-watered and the eggs can be kept moist for up to 24 hrs or longer, until replacement pumps can be installed or the line repaired.
2) If that is not possible, well water from the auxiliary (unnamed) creek can be used.
3) If all water lines are ruptured, egg trays could be carried out to the rearing raceways or earthen pond and supplied with gently moving water at those locations.

*Rearing:* In the event that water flow is disrupted, some of the fish could be converted to well water, if it is available. If all water supplies are disrupted, fry can be maintained by supplying each raceway with air stones that are fed by cylinders of compressed air, or (depending upon conditions in the river and time of year) the fish could be released into the Grays River.

### 10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

- The production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal delay in the rivers, limiting interactions with naturally produced juveniles.
- Coho smolts are released in May to allow listed Chinook to grow to a size that will reduce predation opportunities, and still be in advance of winter and summer steelhead fry emergence in Columbia River tributaries.
- Returning hatchery fish are under heavy selective harvest, and may be differentiated from natural-origin fish by the adipose fin-clip or CWT.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to access, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Grays River Hatchery programs are communicated to WDFW Region 5 staff for any risk management or needed treatment. See also HGMP section 9.7.

# 11 SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

## 11.1 Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

### 11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Performance indicators for harvest will be accomplished by continuing mass marking (ad clip). CWT recoveries will help determine stray rate contributions on spawning grounds by watersheds close in proximity to this program's release vicinity. See HGMP section 1.10 Monitoring and Evaluation for additional plans and methods to collect data necessary.

*Additional research, monitoring and evaluation in the Lower Columbia.* WDFW is currently conducting the following Mitchell Act-funded research, monitoring and evaluation projects:

**Table 11.1.1.1:** Current WDFW Mitchell Act-funded research, monitoring and evaluation projects.

| Project | Description |
|---|---|
| LCR Monitoring | WDFW has implemented an expanded monitoring program for Chinook, coho, chum and steelhead populations in the Lower Columbia River (LCR) region of Southwest Washington (WDFW's Region 5) and fishery monitoring in the lower mainstem of the Columbia River. The focus of this expanded monitoring is to 1) gather data on Viable Salmonid Population (VSP) parameters – spawner abundance, including proportion of hatchery-origin spawners (pHOS), spatial distribution, diversity, and productivity, 2) to increase the coded wire tag (CWT) recovery rate from spawning grounds to meet regional standards, and 3) to evaluate the use of PIT tags to develop harvest rates for salmon and steelhead populations. Additionally, key watersheds are monitored for juvenile salmonid out-migrant abundance. Coupled with adult abundance information, these data sets allow for evaluation of freshwater productivity and development of biological reference points, such as seeding capacity. Monitoring protocols and analysis methods utilized are intended to produce unbiased estimates with measurements of precision in an effort to meet NOAA monitoring guidelines (Crawford and Rumsey 2011). |

### 11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Except for a risk involving genetic introgression, all other aspects of the M&E outlined in HGMP section 1.10 are currently funded (see also HGMP section 11.1.1).

## 11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring, evaluation and research follow scientific protocols with adaptive management process if needed. WDFW will take risk aversion measures to eliminate or reduce ecological effects, injury, or mortality as a result of monitoring activities See HGMP section 1.10 Monitoring and Evaluation for additional plans and methods to collect data necessary, In addition, we will adaptively manage all aspects of the program to continue to minimize associated risks using the more recent available scientific research.

# 12 SECTION 12. RESEARCH

## 12.1 Objective or purpose.

No research is directly associated with the program.

## 12.2 Cooperating and funding agencies.

Any research is conducted by WDFW and funded through Tacoma Power.

**12.3 Principle investigator or project supervisor and staff.**

Cowlitz Hatchery Biologist

**12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.**

Not applicable.

**12.5 Techniques: include capture methods, drugs, samples collected, tags applied.**

Not applicable.

**12.6 Dates or time period in which research activity occurs.**

Not applicable.

**12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.**

Not applicable.

**12.8 Expected type and effects of take and potential for injury or mortality.**

Not applicable.

**12.9 Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).**

Not applicable.

**12.10 Alternative methods to achieve project objectives.**

Not applicable.

**12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.**

Not applicable.

**12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.**

Not applicable.

# 13 SECTION 13. ATTACHMENTS AND CITATIONS


Beamesderfer, R., L. Berg, M. Chilcote, J. Firman, E. Gilbert, K. Goodson, D. Jepsen, T. Jones, S. Knapp, C. Knutsen, K. Kostow, B. McIntosh, J. Nicholas, J. Rodgers, T. Stahl, and B. Taylor. 2010. Lower Columbia River conservation and recovery plan for Oregon populations of salmon and steelhead. Oregon Department of Fish and Wildlife. 423 pp. Salem, Oregon. Available from: http://www.dfw.state.or.us/fish/CRP/docs/lower-columbia/OR_LCR_Plan%20-%20Aug_6_2010_Final.pdf.

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# Attachment 1: WDFW Virology Sampling 2005-2006 through 2012-2013: Grays River Hatchery.

| Hatchery/ Collection Site | Stock | Species | Date Sampled | Results | Comments | Life Stage | Sample number | Number of fish sampled | | | | | | ID | Cell Line | Inoc Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | OF | pools | K/S | pools | fry/visc | pools | | | |
| GRAYS R | GRAYS R | CHUM | 11/09/05 | NEV | | AD | 1109-11/12 | 12 | 3 | 12 | 3 | | | | | |
| GRAYS R | GRAYS R | CHUM | 11/16/05 | NEV | frozen on 11/18, thawed on 11/21 & proc'd | AD | 1118-3/4 | 40 | 8 | 39 | 8 | | | | | |
| GRAYS R | GRAYS R | CHUM | 11/22/05 | NEV | | AD | 1122-11/12 | 11 | 3 | 25 | 5 | | | | | |
| GRAYS R | GRAYS R | COHO | 11/01/05 | NEV | | AD | 1102-3/4 | 60 | 12 | 60 | 12 | | | | | |
| GRAYS R | GRAYS R | CHUM | 11/15/06 | NEV | | AD | 1116-1/2 | 29 | 6 | 29 | 6 | | | | | |
| GRAYS R | GRAYS R | CHUM | 11/21/06 | NEV | | AD | 1122-1/2 | 28 | 6 | 28 | 6 | | | | | |
| GRAYS R | GRAYS R | SCOHO | 10/24/06 | NEV | | AD | 1025-3/4 | 60 | 12 | 60 | 12 | | | | | |
| GRAYS R | GRAYS R | SCOHO | 10/23/07 | NEV | | AD | 1024-3/4 | 60 | 12 | 60 | 12 | | | | | |
| GRAYS R | GRAYS R | CHUM | 11/07/07 | NEV | | AD | 1108-5/6 | 23 | 5 | 23 | 5 | | | | | |
| GRAYS R | GRAYS R | CHUM | 11/15/07 | NEV | | AD | 1115-19/20 | 20 | 4 | 20 | 4 | | | | | |
| GRAYS R | GRAYS R | CHUM | 11/27/07 | NEV | | AD | 1127-13/14 | 10 | 2 | 10 | 2 | | | | | |
| GRAYS R | LEWIS R | SPCHIN | 10/02/07 | NEV | pd 7; diag; $10^{0}$, $10^{-1}$, $10^{-2}$, $10^{-3}$ | JUV/06 | 1003-16 | | | 3 | 1 | | | | | |
| GRAYS | GRAYS R | SCOHO | 10/23/08 | NEV | | AD | 1024-7/8 | 60 | 12 | 60 | 12 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/18/08 | NEV | | AD | 1118-18/19 | 16 | 4 | 35 | 7 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/20/08 | NEV | | AD | 1121-1/2 | 21 | 5 | 39 | 10 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/25/08 | NEV | | AD | 1125-9 | 5 | 1 | | | | | | | |
| GRAYS | GRAYS R | CHUM | 11/05/09 | NEV | OF: F1-5 → 21-24, F&M: 1-5 → 21-24 | AD | 1105-10/11 | 24 | 5 | 48 | 10 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/05/09 | NEV | OF: F1-5 → 21-24, F&M: 1-5 → 21-24 | AD | 1105-10/11 | 24 | 5 | 48 | 10 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/10/09 | NEV | #25-29, 30-34, 35-39 | AD | 1110-20/21 | 15 | 3 | 30 | 6 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/10/09 | NEV | #25-29, 30-34, 35-39 | AD | 1110-20/21 | 15 | 3 | 30 | 6 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/17/09 | NEV | | AD | 1117-15 | 20 | 4 | | | | | | | |
| GRAYS | GRAYS R | CHUM | 11/17/09 | NEV | | AD | 1117-15 | 20 | 4 | | | | | | | |
| GRAYS | GRAYS R | SCOHO | 10/28/10 | NEV | | AD | 1028-1/2 | 18 | 4 | 60 | 12 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/02/10 | NEV | | AD | 1102-11/12 | 12 | 3 | 18 | 4 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/08/10 | NEV | | AD | 1109-7/8 | 33 | 7 | 33 | 9 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/10/10 | NEV | | AD | 1110-5 | 59 | 12 | | | | | | | |
| GRAYS | GRAYS R | NCOHO | 12/07/10 | NEV | | AD | 1208-12/13 | 60 | 12 | 60 | 12 | | | | | |
| GRAYS | GRAYS R | WSTHD | 01/12/11 | NEV | K/S: 42 F + 18 F, Tiny samples | AD | 0113-2/3 | 42 | 10 | 60 | 12 | | | | | |
| GRAYS | GRAYS R/ ELOCHOMAN R | WSTHD | 06/13/11 | NEV | diag, $10^{0}$-$10^{-3}$, Int 3, all morts | JUV/11 | 0614-1 | | | | | 15 | 3 | | | |
| GRAYS | GRAYS R/ ELOCHOMAN R | WSTHD | 06/13/11 | NEV | diag, $10^{0}$-$10^{-3}$, Int 4, #1, 2=moribund, #3,4= morts | JUV/11 | 0614-2 | | | | | 20 | 4 | | | |
| GRAYS | GRAYS R | CHUM | 11/02/11 | NEV | 6 pools female, 5 pools male | AD | 1103-3/4 | 28 | 6 | 52 | 11 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/07/11 | NEV | | AD | 1108-1/2 | 25 | 5 | 8 | 2 | | | | | |
| GRAYS | COWLITZ R | SPCHIN | 11/08/11 | NEV | Diag $10^{0}$-$10^{-3}$, BP | AD | 1109-4 | | | 6 | 2 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/09/11 | NEV | | AD | 1110-7 | 25 | 5 | | | | | | | |
| GRAYS | GRAYS R | CHUM | 11/17/11 | NEV | | AD | 1118-3 | 60 | 12 | | | | | | | |
| GRAYS | GRAYS R | CHUM | 11/22/11 | NEV | | AD | 1123-3 | 13 | 3 | | | | | | | |
| GRAYS | COWLITZ R | SPCHIN | 11/22/11 | NEV | rcwy 2 & 3, fry without tails, run diag dilutions | JUV/11 | 1123-8 | | | | | 10 | 2 | | | |

| Hatchery/ Collection Site | Stock | Species | Date Sampled | Results | Comments | Life Stage | Sample number | Number of fish sampled | | | | | | ID | Cell Line | Inoc Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | OF | pools | K/S | pools | fry/visc | pools | | | |
| GRAYS | GRAYS R | NCOHO | 12/07/11 | NEV | | AD | 1208-1/2 | 60 | 12 | 60 | 12 | | | | | |
| GRAYS/BEAVER CR | ELOCHOMAN R | WSTHD | 12/15/11 | NEV | | AD | 1216-1/2 | 12 | 3 | 20 | 4 | | | | | |
| GRAYS/BEAVER CR | ELOCHOMAN R | WSTHD | 01/04/12 | NEV | | AD | 0105-18/19 | 60 | 12 | 60 | 12 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/06/12 | NEV | | AD | 1107-5/6 | 41 | 9 | 60 | 12 | | | | | |
| GRAYS | GRAYS R | CHUM | 11/15/12 | NEV | | AD | 1116-1 | 60 | 12 | | | | | | | |
| GRAYS | GRAYS R | NCOHO | 12/05/12 | NEV | | AD | 1206-5/6 | 60 | 12 | 60 | 12 | | | | | |
| GRAYS | ELOCHOMAN R | WSTHD | 05/06/13 | NEV | diag, tails off | JUV13 | 0506-3 | | | | | 6 | 2 | | | 10/5/12 |
| GRAYS | ELOCHOMAN R | WSTHD | 05/21/13 | NEV | diag, tails off, 10*0 - 10-3 | JUV13 | 0522-3 | | | | | 4 | 1 | | | 1/17/12 |

Source: WDFW Fish Health Lab data (John Kerwin 2014)

# Attachment 2 – Fish health summaries: Grays River Hatchery, October 1, 2009 through March 31, 2009 to October 1, 2011 through March 31, 2012.

## Grays River Hatchery Coho

**Juveniles:**

***2010 brood year N-coho***

This stock suffered some lingering loss in October and botulism was suspected along with low levels of *Trichodina*. The fish were treated with oxytetracycline medicated feed and the crew kept the loss picked from the pond bottom as well as on the screen and loss declined. The fish remained healthy through the rest of this reporting cycle.

**Adults:**

***N-coho (Elochoman River stock)*** – Eggs were collected at Elochoman Hatchery and transferred green to Grays River Hatchery. No viruses were detected in a sample of 60 fish submitted in five fish pools.

***2011 N-coho***

Sixty of the spawning adults were tested for regulated viral pathogens and no virus was detected.

# 14 SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

# 15 ADDENDUM A. PROGRAM EFFECTS ON OTHER (AQUATIC OR TERRESTRIAL) ESA-LISTED POPULATIONS. (Anadromous salmonid effects are addressed in Section 2).

## 15.1 List all ESA permits or authorizations for USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species associated with the hatchery program.

The WDFW and the USFWS have a Cooperative Agreement pursuant to section 6(c) of the Endangered Species Act that covers the majority of the WDFW actions, including hatchery operations.

> *"The department is authorized by the USFWS for certain activities that may result in the take of bull trout, including salmon/steelhead hatchery broodstocking, hatchery monitoring and evaluation activities and conservation activities such as adult traps, juvenile monitoring, spawning ground surveys..."*

## 15.2 Describe USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species and habitat that may be affected by hatchery program.

Several listed and candidate species are found in Cowlitz, Clark and Skamania Counties; however the hatchery operations and facilities for this program do not fall within the critical habitat for any of these species. As such there are no effects anticipated for these species.

"No effect" for the following listed species:

Bull trout (*Salvelinus confluentus*) – Threatened (Critical Habitat Designated)
Marbled murrelet (*Brachyramphus marmoratus*) –Threatened (Critical Habitat Designated)
Columbian White-Tailed deer (*Odocoileus virginianus leucurus*) – Endangered
Northern Spotted owl (*Strix occidentalis caurina*) –Threatened (Critical Habitat Designated)

**Candidate Species:**
(Cathlamet) Mazama pocket gopher (*Thomomys mazama* ssp. *louiei*) [historic]
Streaked horned lark (*Eremophila alpestris strigata*)

## 15.3 Analyze effects.

Not applicable.

## 15.4 Actions taken to minimize potential effects.

Program fish are released fully smolted to foster rapid outmigration from the basin and to minimize predation and residualism risks.

## 15.5 References

Not applicable.

# 16 "Take" Tables

**Table 1a.** Estimated listed salmonid take levels of by hatchery activity.

| **Listed species affected:** Chinook (*Oncorhynchus tshawytscha*) | **ESU/Population:** Lower Columbia River Chinook | **Activity:** Grays River Type-N Coho Program |
|---|---|---|
| **Location of hatchery activity:** Grays River Hatchery: West Fork Grays River , RKm 3.2 | **Dates of activity:** September-January | **Hatchery program operator:** WDFW |

| **Type of Take** | **Annual Take of Listed Fish By Life Stage *(Number of Fish)*** | | | |
|---|---|---|---|---|
| | **Egg/Fry** | **Juvenile/Smolt** | **Adult** | **Carcass** |
| **Observe or harass** [a] | | | | |
| **Collect for transport** [b] | | | | |
| **Capture, handle, and release** [c] | | | TBD | |
| **Capture, handle, tag/mark/tissue sample, and released** [d] | | | | |
| **Removal (e.g. broodstock)** [e] | | | | |
| **Intentional lethal take** [f] | | | | |
| **Unintentional lethal take** [g] | | TBD | | |
| **Other Take (specify)** [h] | | | | |

Take Table to be submitted to NOAA-NMFS, in progress.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

***Instructions:***

*1. An entry for a fish to be taken should be in the take category that describes the greatest impact.*
*2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).*
*3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.*

**Table 1b.** Estimated listed salmonid take levels of by hatchery activity.

| **Listed species affected:** Steelhead *(Oncorhynchus mykiss*) | **ESU/Population:** Lower Columbia River Steelhead | **Activity:** Grays River Type-N Coho Program | |
|---|---|---|---|
| **Location of hatchery activity:** Grays River Hatchery: West Fork Grays River , RKm 3.2 | **Dates of activity:** September-January | **Hatchery program operator:** WDFW | |
| **Type of Take** | **Annual Take of Listed Fish By Life Stage *(Number of Fish)*** | | |
| | **Egg/Fry** | **Juvenile/Smolt** | **Adult** | **Carcass** |
| **Observe or harass** [a] | | | | |
| **Collect for transport** [b] | | | | |
| **Capture, handle, and release** [c] | | | TBD | |
| **Capture, handle, tag/mark/tissue sample, and released**[d] | | | | |
| **Removal (e.g. broodstock)** [e] | | | | |
| **Intentional lethal take** [f] | | | | |
| **Unintentional lethal take** [g] | | TBD | | |
| **Other Take (specify)** [h] | | | | |



a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

**Table 1c.** Estimated listed salmonid take levels of by hatchery activity.

| **Listed species affected:** Coho (*Oncorhynchus kisutch*) | **ESU/Population:** Lower Columbia River Coho | **Activity:** Grays River Type-N Coho Program |
|---|---|---|
| **Location of hatchery activity:** Grays River Hatchery: West Fork Grays River , RKm 3.2 | **Dates of activity:** September-January | **Hatchery program operator:** WDFW |

| **Type of Take** | **Annual Take of Listed Fish By Life Stage *(Number of Fish)*** | | | |
|---|---|---|---|---|
| | **Egg/Fry** | **Juvenile/Smolt** | **Adult** | **Carcass** |
| **Observe or harass** [a] | | | | |
| **Collect for transport** [b] | | | | |
| **Capture, handle, and release** [c] | | | | |
| **Capture, handle, tag/mark/tissue sample, and released** [d] | | | | |
| **Removal (e.g. broodstock)** [e] | | | TBD | |
| **Intentional lethal take** [f] | | | TBD | |
| **Unintentional lethal take** [g] | TBD | TBD | | |
| **Other Take (specify)** [h] | | | | |

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

**Table 1e.** Estimated listed salmonid take levels of by hatchery activity.

| **Listed species affected:** Chum (*Oncorhynchus keta*) | **ESU/Population:** Columbia River Chum | **Activity:** Grays River Type-N Coho Program | |
|---|---|---|---|
| **Location of hatchery activity:** Grays River Hatchery: West Fork Grays River , RKm 3.2 | **Dates of activity:** September-January | **Hatchery program operator:** WDFW | |
| **Type of Take** | **Annual Take of Listed Fish By Life Stage *(Number of Fish)*** | | |
| | **Egg/Fry** | **Juvenile/Smolt** | **Adult** | **Carcass** |
| **Observe or harass [a]** | | | | |
| **Collect for transport [b]** | | | | |
| **Capture, handle, and release [c]** | | | | |
| **Capture, handle, tag/mark/tissue sample, and released[d]** | | | TBD | |
| **Removal (e.g. broodstock) [e]** | | | | |
| **Intentional lethal take [f]** | | | | |
| **Unintentional lethal take [g]** | | TBD | | |
| **Other Take (specify) [h]** | | | | |

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.